TECHNOLOGY DEPT.

- Sonoco's biological waste disposal system
- Improved glass-fiber paper
- C-Z opens new research laboratory
- Carbohydrate constituents of pulps and pulp sources

The Paper Industry

OCT 24 1955
DETROIT

Let us put the SQUEEZE

ON HIGH EVAPORATING COSTS!

. . . and give you assured results, too!

From start to finish, Swenson offers much more than the equipment alone. You can get preliminary product research and testing in the Swenson laboratory . . . evaporators that are custom-engineered for your products . . . surveillance of operation and periodic checks after installation.

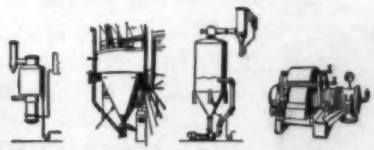
Swenson engineers, with over 65 years of experience, will counsel with you about economy, capacity, construction and operation of long-tube evaporators, forced circulation and other types.

You can carry economy into other parts of your operations by including Swenson pulp washing, heat recovery and filtering, too. Take this step toward greater savings and efficiency by writing for your copy of the Swenson catalog.

SWENSON EVAPORATOR CO.
15653 Lathrop Avenue, Harvey, Illinois

SWENSON
Proved Engineering for the Process Industries
SINCE 1889

A Division of WHITING Corporation



TR v.37 no 1 '55 - Mr '56

● Early [illegible]h Century Chinese [illegible]ate wit[illegible] Yang-Yin symbol in the cente[illegible] From the collecti[illegible] of Ca[illegible]ain and Mrs. H. F. D[illegible] Davis, now o[illegible]ed by Mrs. H. N. H[illegible]

This symbol (Yang-Yin) represents T'ai-chi, the old Chinese *Ultimate Principle*, and as such, *perfection*. As the Asten-Hill trademark it symbolizes the *best* in paper mill DRYER FELTS.

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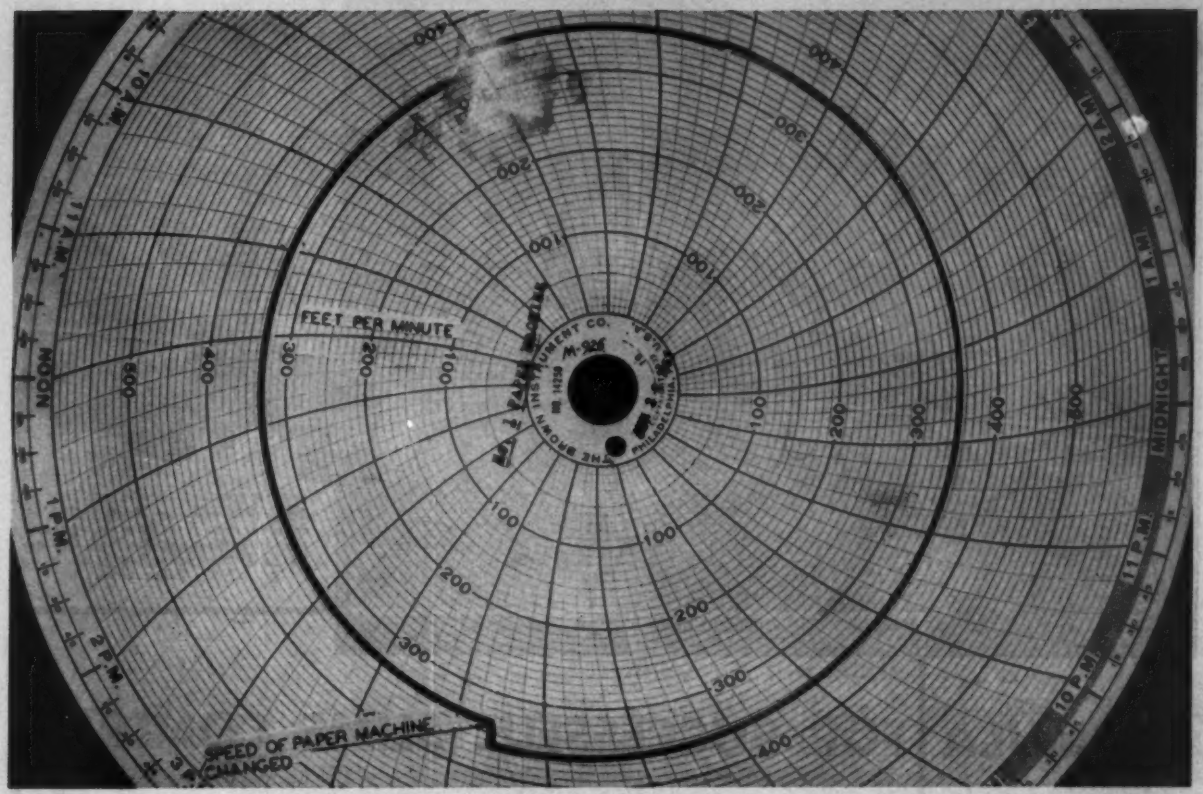
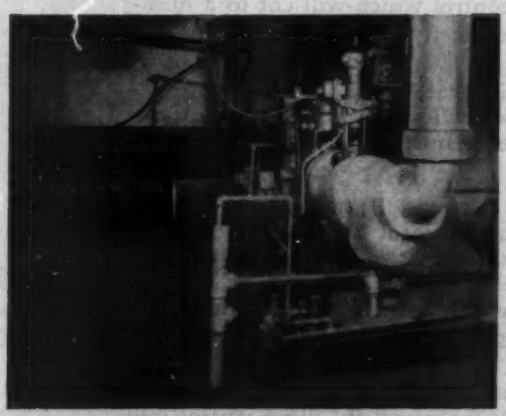
Tech

Look at this actual record



ACTUAL 24-HR. TACHOMETER RECORDING CHART shows steady speed maintained by a Worthington drive turbine.

for proof of steady lineshaft speed!



362 HP WORTHINGTON multi-stage turbine and reduction gear, driving paper machine in famous paper plant.

Worthington steam turbine drive maintains constant speed within ¼ of 1%

The speed chart above was taken recently from the tachometer of a Worthington steam turbine driving one of the hardest-working paper machines in the country.

It shows graphically how closely the sensitive governor on this turbine provides the smooth, steady speed essential to fine paper making. Installed more than 7 years ago, the turbine has given continuous service with constant speed held to within ¼ of 1% at any given speed setting. Wide governor speed range meets the requirements of any run.

This precise control pays off in greater output . . . lowered breakage rate . . . and better quality paper. Steam and maintenance costs nosedive, too.

All Worthington paper machine drive turbines are made to fit your plant layout. And you can have labor-saving remote speed control if you like. For more information, check your nearest Worthington office or write for new Bulletin 1965, Worthington Corporation, Harrison, N.J. T.S.1

WORTHINGTON

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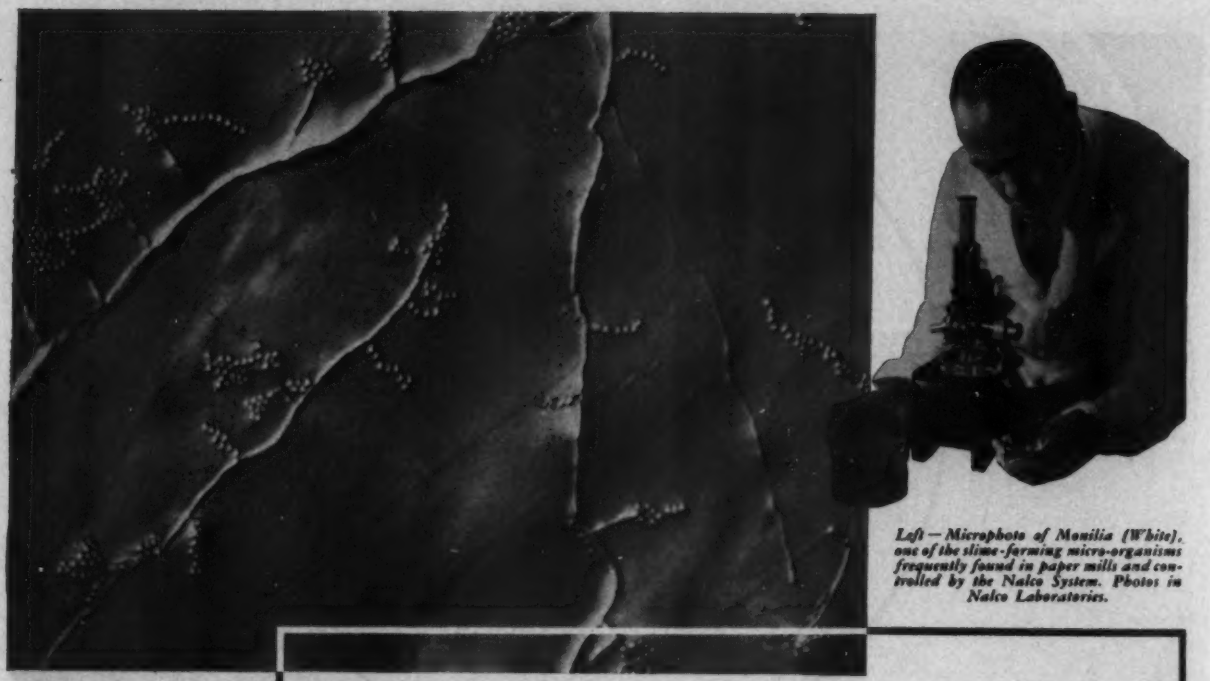
Single- and Multi-Stage Turbines • Turbine-Generators • Deaerators • Boiler Feed Pumps • Surface Condensers

A GREAT TEAM IN STEAM



Left — Microphoto of Monilia (White), one of the slime-forming micro-organisms frequently found in paper mills and controlled by the Nalco System. Photos in Nalco Laboratories.

FORMULA FOR SUCCESSFUL SLIME CONTROL

SLIME control, like paper making itself, requires constant and careful attention to details. Here is a formula for successful slime control which will cut to a minimum, spots and specks, breaks, cleaning, and other costly problems due to slime:

- Identify slime-forming organisms to be controlled.

A NALCO SERVICE

- Determine the best types of treatment to be used.

A NALCO SERVICE

- Locate, by detailed survey, the proper points of application.

A NALCO SERVICE

- Provide consistent supervision to check application and effectiveness of treatment.

A NALCO SERVICE

- Maintenance of high standards of sanitation throughout the mill. (Even the best of treating and scientific control can be seriously hampered by unsanitary conditions.)

Nalco Field Representatives and the modern, scientific facilities of the Nalco Laboratories are at your service to put this formula for successful slime control into practical operation in your mill. Write for details today.

NATIONAL ALUMINATE CORPORATION
6232 W. 66th Place • Chicago 38, Illinois

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nalco

erving the Paper Industry through Practical Applied Science

The Paper Industry

Technology • Engineering • Management • Production

VOLUME 37 • NUMBER 7 • OCTOBER 1955

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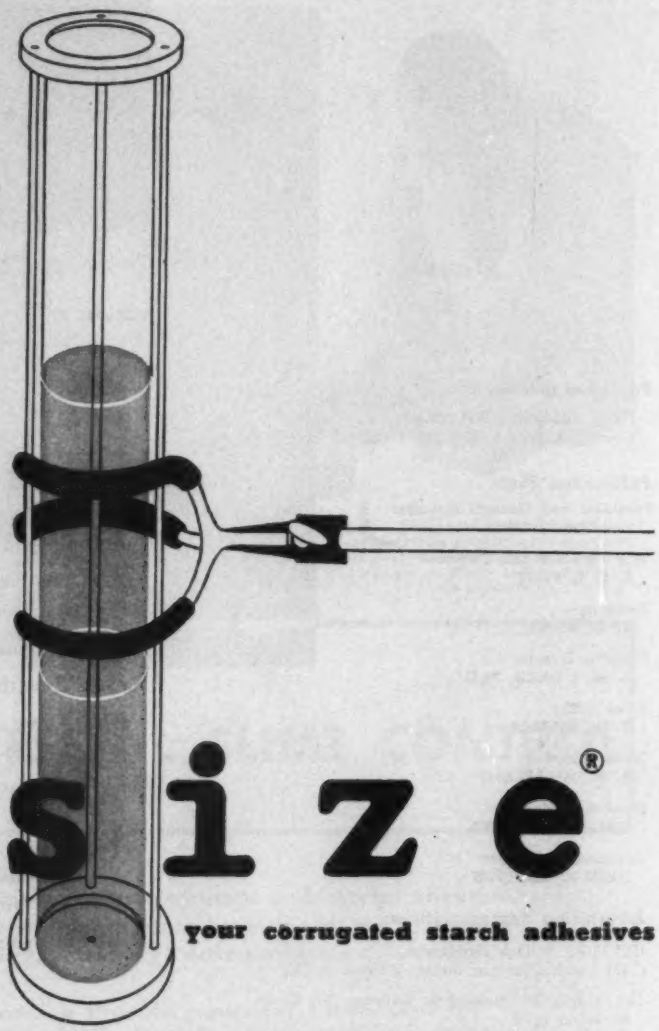
Contact our technical service department to get complete information on the measurable benefits of **KELSIZE** in your starch corrugated adhesive.



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Kelsize®

to stabilize viscosity of your corrugated starch adhesives

uniform flow properties insure even pick up of adhesive,

uniform operation,

uniform board less waste!

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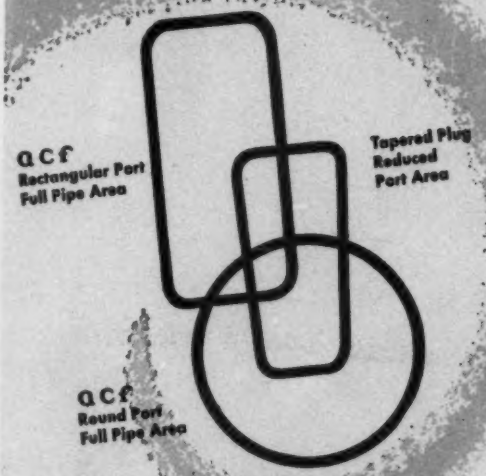
BEFORE YOU BUY ANOTHER PLUG VALVE...



COMPARE THE PORT OPENINGS!

acf Plug Valves are backed up by Proof-of-Performance in every Processing Industry!

Turbulence! Loss of head pressure! These can present real problems when handling slurries and other viscous liquids! And because they are ordinarily the result of valves with "funnel action"...it pays you to make sure that the port opening has the same area as the pipe itself!

Pipe-matching port openings! This is only one of the reasons why more processing engineers than ever before are swinging over to acf Round Port Valves and Rectangular Port Valves. Other features, such as split-second, quarter-turn shut off...specially designed TEFLON* GASKET to prevent head leakage...all add up to lower maintenance costs and fewer work stoppages.

WRITE TODAY for descriptive Catalog E-8, acf Industries, Incorporated, Valve Division, 1501 E. Ferry Avenue, Detroit 11, Michigan

GET YOUR COPY of the acf Lube Manual, a complete description of lubricants and service recommendations. Ask for Manual No. 3.

*DuPont Tradename

acf CYLINDRICAL FULL PIPE AREA **PLUG VALVES**

New Plant now in production taps natural source of sodium sulfate

West End Chemical Company now is producing Salt Cake and Anhydrous Sodium Sulfate at the rate of approximately 50,000 tons annually. These new products maintain the *premium quality* which has characterized West End Soda Ash and Borax for over 30 years. We proudly add Salt Cake and Anhydrous Sodium Sulfate to the list of industrial chemicals carrying the well-known West End brand.

WEST END
CHEMICAL COMPANY
SODA ASH • BORAX • SODIUM SULFATE
SALT CAKE • HYDRATED LIME

West End will be pleased to submit samples, prices and freight schedules for your evaluation upon receipt of your inquiry. We request that you include any applicable specifications governing your requirements for these products.

West End Chemical Co.

Executive Offices: Nineteen Fifty-Six Webster Bldg., Oakland 12, California • Plant: Westend, California

There are Qualities *Behind* ANNIN VALVES you'll never find in imitations

ANNIN DEVELOPED AND INTRODUCED:

SPLIT BODY

The Annin split-body design has given Industry new standards in control valve construction: lower body pressure loss, greatly reduced erosion, greater rangeability, longer life and reduced maintenance.

DOMOTOR OPERATOR

Out-performs all other pneumatic valve actuators. They are the highest speed, most powerful, and provide the best response characteristics. Long strokes assure that all size valves are truly hi-lift control valves.

TEFLON SEAT SEAL

The teflon seat seal for absolute tight closure, teflon guide bushing to eliminate guide clearance, and teflon V-ring packing for reliable stuffing-box performance were developed and introduced by Annin.

DOOLSEAL

Providing a new high in stuffing-box practice, the Doolseal, originally developed and introduced by Annin, assures reliable seal for hard-to-handle or toxic chemicals without resorting to mechanical seals.

...and many others!

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ANNIN *Control* VALVES

THE ANNIN COMPANY
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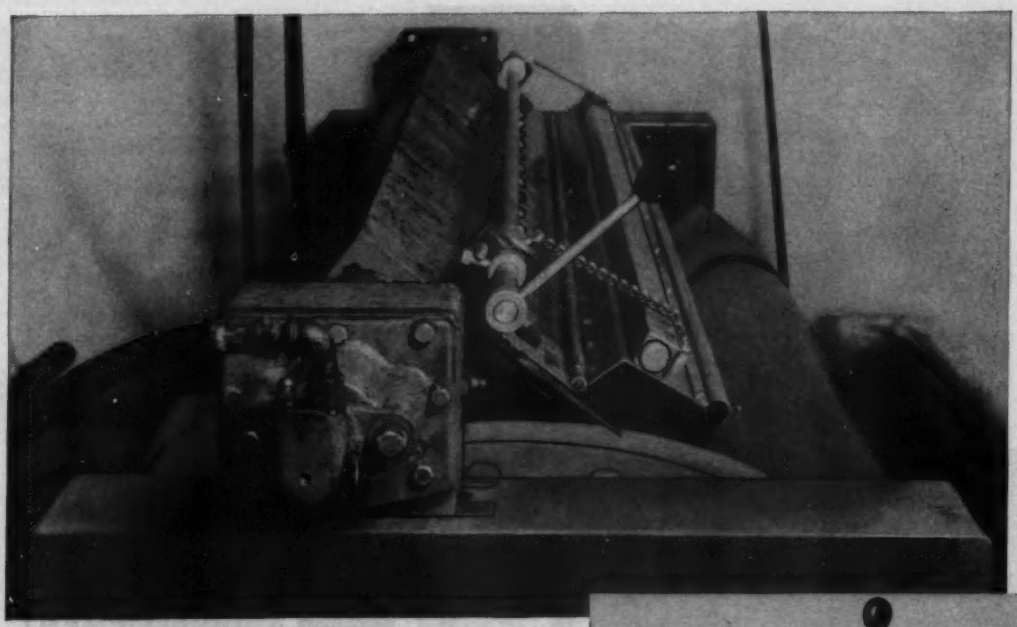
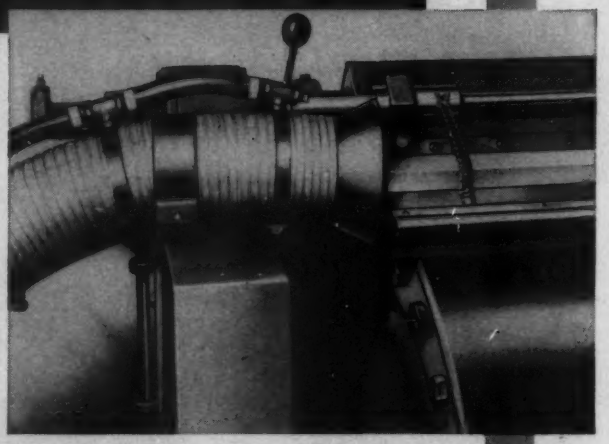


Dryer Doctor with Fuzz Remover installed. (Exhaust Elbow removed to show cross-section). Exhaust Elbow in place, right.



The first universally satisfactory answer to a paper maker's long-standing problem . . . .

LODDING FUZZ REMOVER

is IT — all the way from board to bible paper

Every paper maker knows fuzz is a nuisance in the air and on the sheet. Lodding engineers, after years of study and experimentation, announce a solution of this problem. Working on a new principle — a series of air jets scientifically put to work — they have arrived at a highly successful solution at low cost for installation and operation. This means a better sheet, free from scabs and lint . . . greater drying efficiency from cleaner dryers . . . removal of the fire hazard caused by airborne floating fuzz. Application of this equipment to several machines has resulted in outstanding benefit.

LODDING ENGINEERING CORPORATION

WORCESTER, MASSACHUSETTS

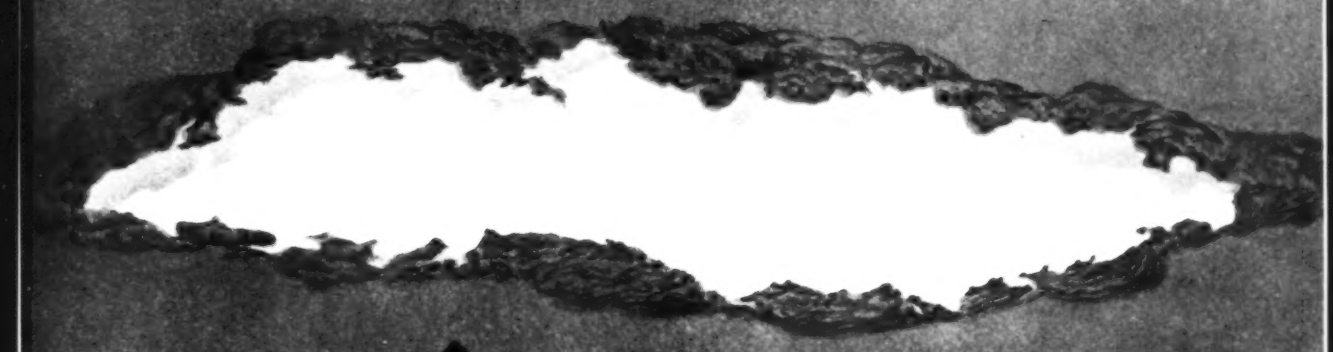
2-point slime control plan

first scientific solution to the slime problem

Add a bacteriologist or chemist to your staff without cost!

1

The Technical Service Representative from United States Movidyn Corporation is university-trained, and thoroughly experienced in slime control. His job is *service* rather than selling, and he'll work with you for as long as he's needed. Using the compact mobile laboratory carried in his car (or your mill laboratory) he'll analyze and solve your slime problem under actual operating conditions—and at no additional cost to you!



One product can solve your slime problem economically!

2

No need to alternate with any other slimicides! SLIMODYN contains three powerful heavy metal toxicants for use in most white water systems. MICRODYN is specially formulated for application in paper mills where mercurials are objectionable. SLIMODYN and MICRODYN, being completely dispersible in water, are suitable for spraying after washups, and adsorb readily on surfaces to build a residual germicidal activity. They are relatively unaffected by changes in pH; will not shorten wire life or cause foaming.

For complete information, contact

UNITED STATES

Movidyn CORPORATION

863 N. Orleans Street
Chicago 10, Illinois
Telephone WHitehall 3-1530
Cable: MOVIDYN

One of the largest manufacturers of wallboard and insulating board was building a giant new plant in the deep South. They wanted the same smooth pulpwood handling that speeds production at their Virginia plant. So they called in the same engineering-production team — Jeffrey.

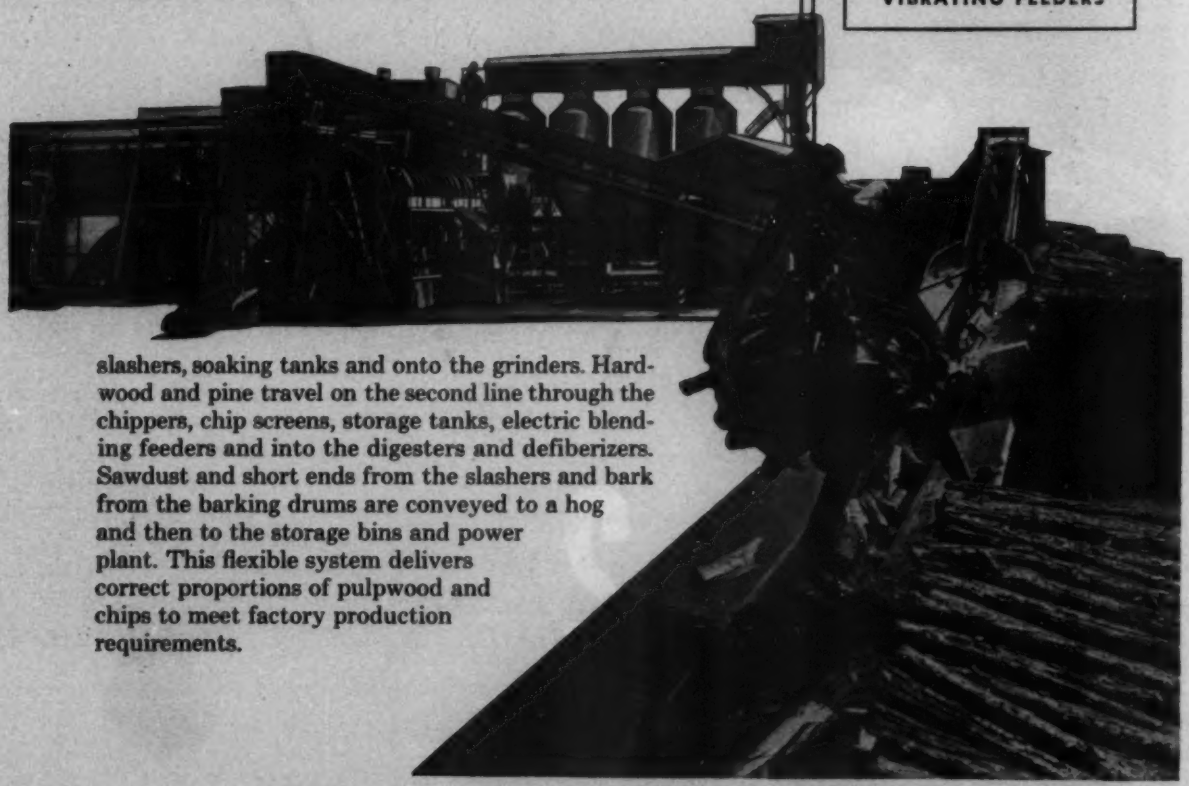
PULP STORY

Jeffrey's conveyor specialists worked with the client's engineers to design two separate lines which handle pine and hardwoods from railroad cars through a dozen processes to the grinders and defiberizers.

An orange-peel grapple drops pine from the cars or storage piles onto the yard conveyors. The first line carries it through the barking drum, slashers, soaking tanks and onto the grinders. Hardwood and pine travel on the second line through the chippers, chip screens, storage tanks, electric blending feeders and into the digesters and defiberizers. Sawdust and short ends from the slashers and bark from the barking drums are conveyed to a hog and then to the storage bins and power plant. This flexible system delivers correct proportions of pulpwood and chips to meet factory production requirements.

TYPES OF JEFFREY EQUIPMENT USED IN THIS INSTALLATION

BUCKETS • CHAINS
SPIRALS • IDLERS
SPROCKETS
SPLINTER GRINDER
APRON FEEDERS
TRACK HOPPER
VIBRATING FEEDERS



THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

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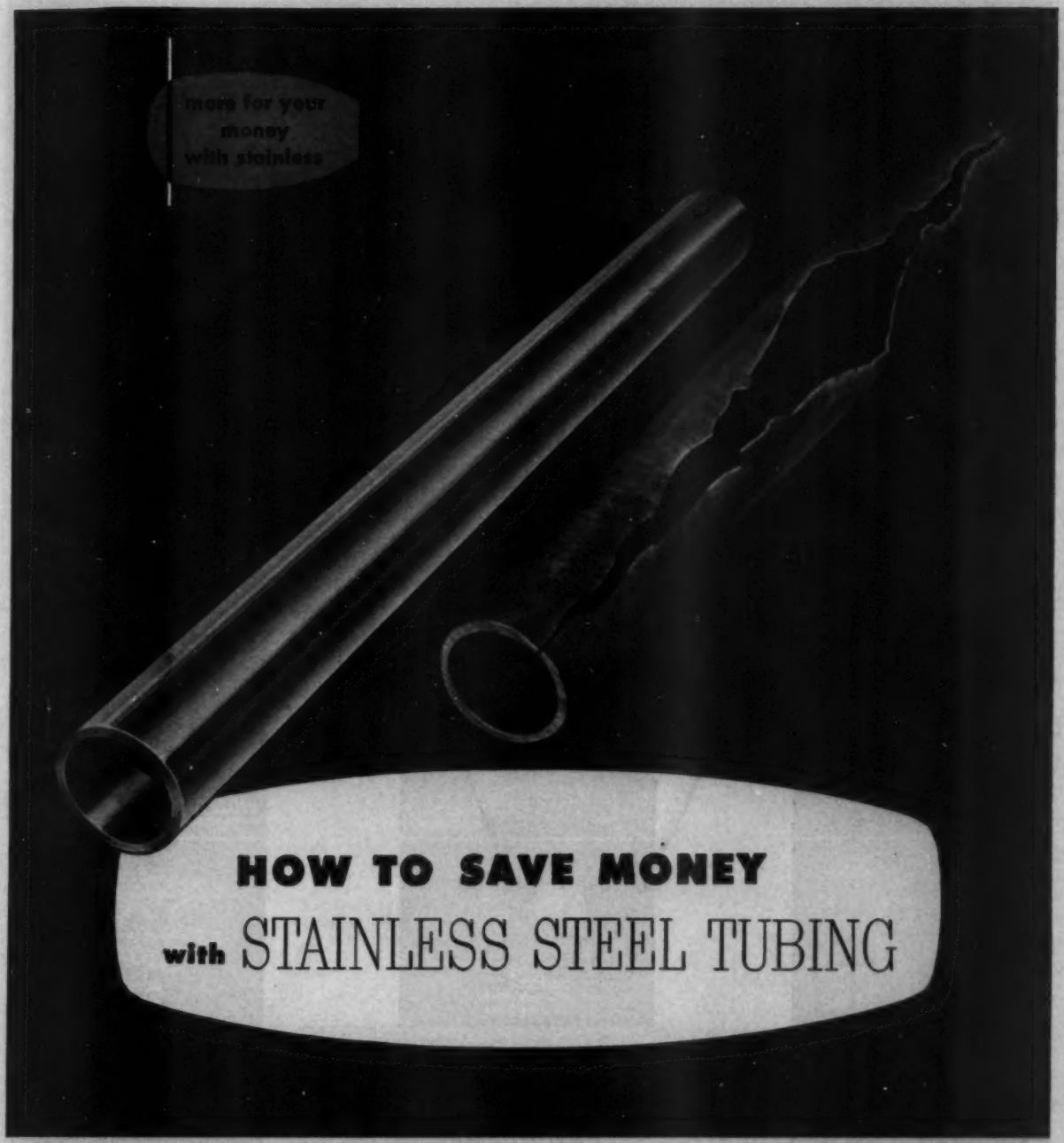
PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!



Downtime and the labor cost of replacing worn-out tubing made of common materials can be a great deal more expensive than the extra first cost of long-lasting stainless.

The tube failure pictured is a dramatic reminder of the indeterminate, and usually shorter, service life of tubing which may bear a smaller price tag, but whose *total* cost can be measured only after the ravages of time and corrosion have tested its durability.

For optimum strength, corrosion resistance and oxidation resistance, there's a stainless grade, size, heat treatment and finish best suited to your particular pressure and temperature requirements. Ask Mr. Tubes, your link to B&W, how to get more for your money with stainless. *Or write for Bulletin TB-356PI.*

B&W
TUBULAR PRODUCTS DIVISION

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
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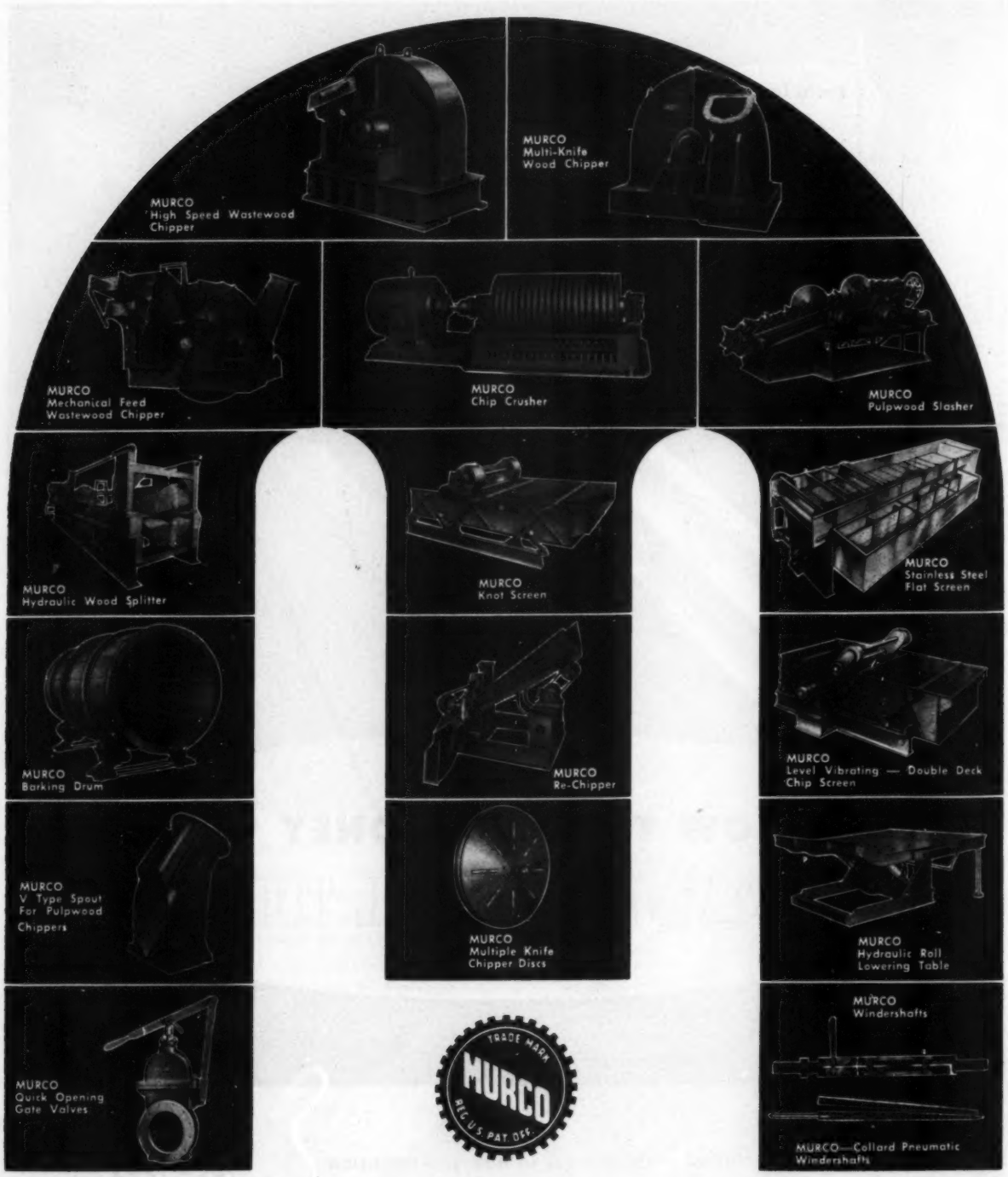

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To the paper industry we offer a specialized service based upon over seventy years close association with the needs of paper manufacturers. Write today for complete catalog information on any items in which you are interested . . . no obligation for our Engineering Department recommendation.

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Manufacturers Since 1883

WAUSAU, WISCONSIN

NOW!

Electronic LIQUID LEVEL CONTROL by FISHER

Fisher Governor Company widens its scope of liquid level measurement and control with the Fisher "Belmont Series" of capacitance type electronic liquid level controllers.

The "Belmont" can be used on most non-adhesive liquids—chemicals, oil, water, refrigerants, liquefied gases. Operating temperature ranges of the sensing elements are from 500° F. to -425° F. Operating pressure range is vacuum to 50,000 psi or higher.

Only two simple adjustments for liquid and differential control.

Fisher Governor Company has purchased the Therma Instruments Company, Belmont, California, which has manufactured and marketed the "Belmont" liquid level control the past ten years.

Write for Bulletin F-100

FISHER

Our 75th ANNIVERSARY

POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES

Fig. 2309—Flush Bottom Tank Valve for 150 Pounds W. P. Disc Opens Into Tank.

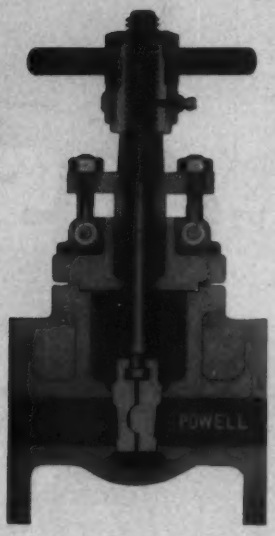

FIG. 2495 (Sectional)—Stainless Steel O. S. & Y. Gate Valve For 150 Pounds W. P. Double Wedge Disc Is Accurately Guided Into Seat.

FIG. 2342—Flanged End Bolted Cap Swing Check Valve. For 150 Pounds W.P.

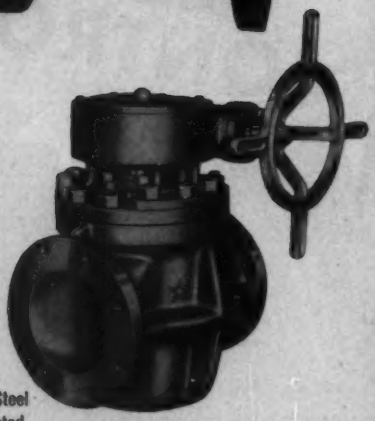

FIG. 3059-G—300-Pound Steel Lubricated Plug Valve. Gear Operated.

POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES

Why Chemical Engineers Specify Powell Valves . . .

. . . *because they know Powell Valves are dependable and economical.* Chemical engineers also know that Powell has *the COMPLETE quality line of valves.*

Investigate the many outstanding features of the Powell Valves shown here... as well as *the complete line* of quality valves that have a proven record of long life and dependable service.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our complete line, and help solve any flow control problem you may have.

The Wm. Powell Company, Cincinnati 22, Ohio . . . . . 109th year

POWELL VALVES

to give you highest sheet standards

Edgar Clay technicians were *first* to "Spray Dry" paper coating clays—the same process used to make your morning's instant coffee.

Results? Ultra-uniform coating clays that do amazing things to paper quality.

Today's "slick" magazines—and countless other printed messengers—owe their bright, smooth finish to this processing milestone. The means and the end are inseparable "first cousins."

Papermakers reap wide benefits from EDGAR Coating Clays, and the modern processing and quality control methods behind them. High brightness, low moisture, minimum residue, controlled viscosity, plus *true uniformity* . . . all are unvaryingly yours in *every* car, year in, year out.

Edgar Spray Dried Products

SPRAY-SATIN Coating Clay: A fine fraction, spray dried, predispersed coating clay with unmatched uniformity, low moisture content, excellent make-down properties, high bulk density, and high brightness. Specially fractionated—ideal for both high and low solids machine and conversion coating and size press coating applications.

PREDISPERSED HT Coating Clay: A spray dried, predispersed, intermediate fraction machine and conversion coating clay suitable for both high and low solids applications . . . excellent for size press pigmentation.

Here's Help For You: To help you select the EDGAR *Paper Clay most suited to your particular requirements, there have just been published the full specifications and basic properties of all* EDGAR *Coating and Filler Clays . . . a copy is yours without obligation . . . please use the coupon below.*

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FANCYWORK QUEEN-1897

This twinkling, alert lady found *her* teen-age fun in organized groups devoted to embroidery, crocheting, fancywork of every kind. And for 54 full years at Appleton Woolen Mills, Bertha Renner has applied that same needle skill and interest to burling—the vital inspection and reweaving operation which insures perfection in every square inch of Appleton felts.

Bertha Renner is representative of the careful, experienced workers at the Appleton Woolen Mills . . . a 73-year-old organization dedicated to development, progress, and the production of ever finer felts—for the finest paper-making.

APPLETON WOOLEN MILLS

APPLETON, WISCONSIN

WATER COLOR PAINTING BY L. J. A. MEEBE

A 12-FOOT YANKEE DRYER, weighing 92,000 pounds, is delicately loaded onto a flatcar at Beloit Iron Works, Beloit, Wisconsin. Years of design and manufacturing experience go into the production of these huge cylinders, each ground to a mirror-like surface by expert grinder operators to provide the maximum in drying capacity and perfection of finish.

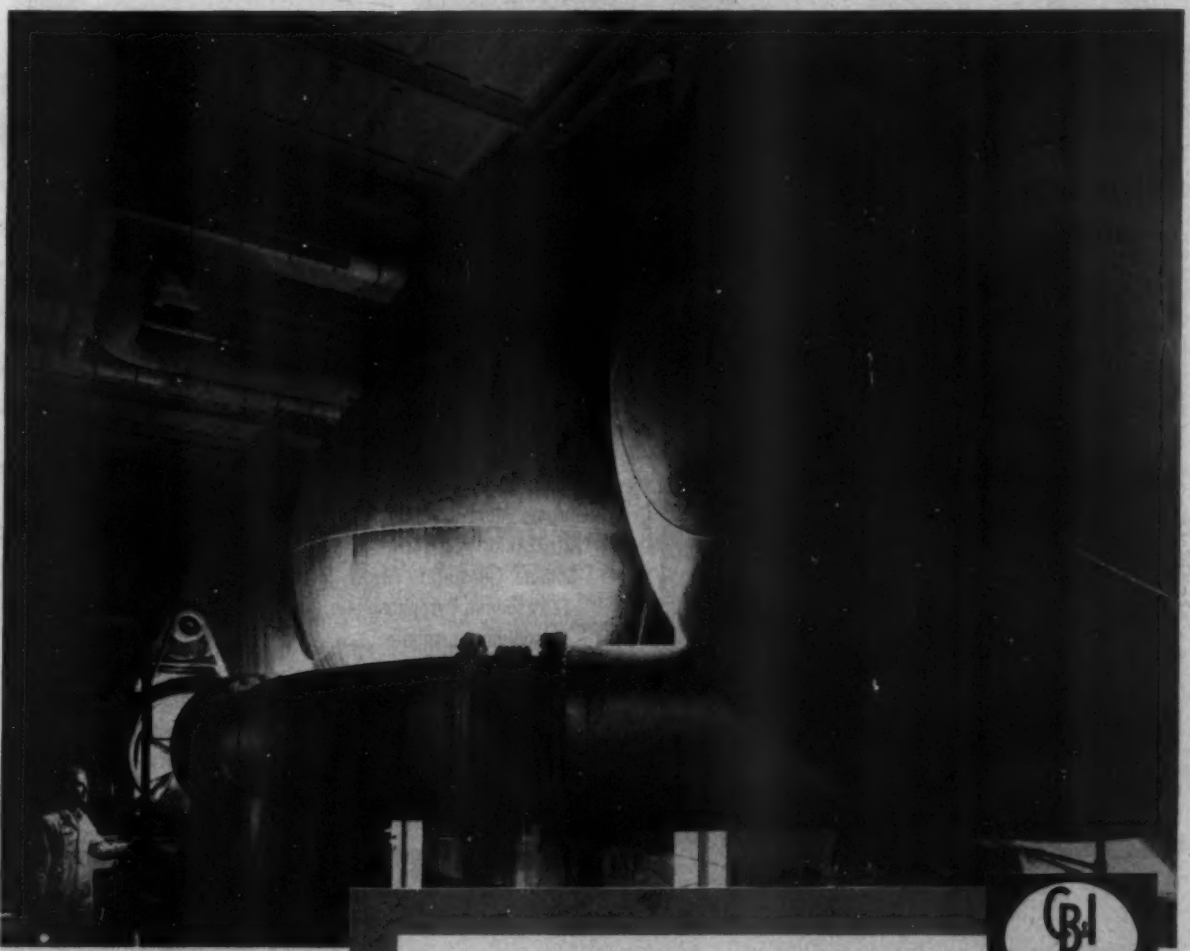
DETROIT PUBLIC LIBRARY

CB&I

Builds Dump Chests Used In Sulphite Recovery Process

At the Weyerhaeuser Timber Company's plant at Longview, Washington, these four welded steel dump chests were installed as part of a sulphite recovery process. The structures, fabricated by Chicago Bridge & Iron Company, receive pulp which is washed from the digesters by sulphite waste liquors. The chests are protected on the inside by acid-resistant linings.

These structures illustrate the skilled workmanship CB&I employs in fabricating and erecting spherical structures.



16-ft. diam. by 71-ft. long chests supported by two ring girders spaced 37-ft. apart. The base of one girder on each vessel is fixed, the other moves as the shell expands and contracts.

CB&I

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
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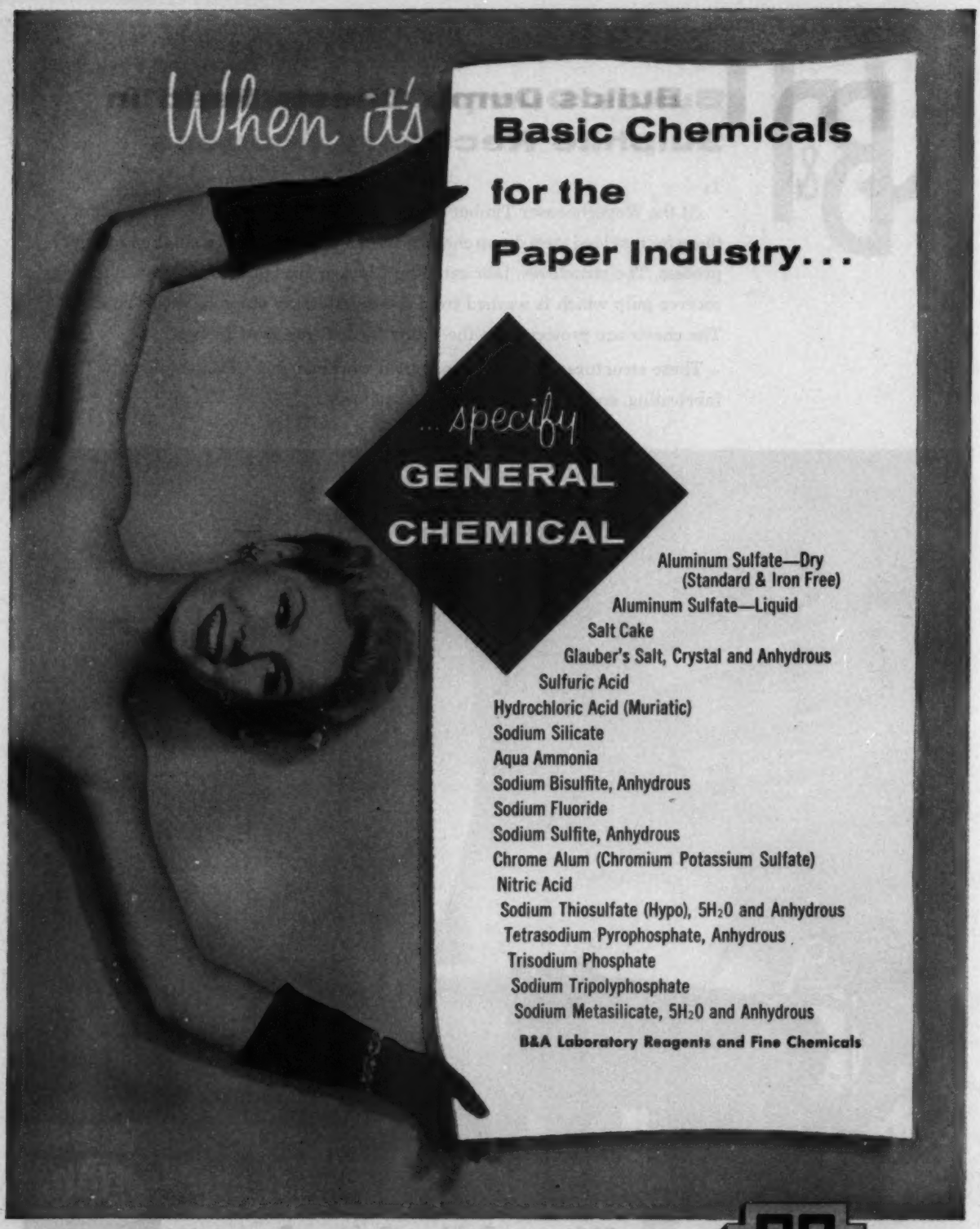
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.



GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
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Basic Chemicals for American Industry

How to judge SUCTION BOX COVERS

Emerson End-of-Grain SUCTION BOX COVERS

Check on these 9 features —

- ✔ **Permanent Frames**
- ✔ **No lost suction**
- ✔ **Greater suction surface**
- ✔ **Long, trouble-free wear**
- ✔ **Wire life protection**
- ✔ **No streaking**
- ✔ **Ease of installation**
- ✔ **Economical replacement**
- ✔ **Easy maintenance**

***You get these features and more in* Emerson End-of-Grain Suction Box Covers.**

Emerson Suction Box Covers come framed in corrosion-resistant brass or stainless steel rails channeled for insertion of wooden strips to form a complete seal on any standard suction box. The Emerson exclusive oblong slots cut on the diagonal provide maximum suction surface, even formation of the sheet without streaking, and freedom from clogging.

Constructed of Vermont Rock Maple with the grain running vertically, Emerson Suction Box Covers outwear the conventional plank covers from 3 to 10 times, depending on the speed of the machine and the grade of paper being made. With ¾" or more wearing surface on each cover, a minimum of dressing is required due to the stubborn resistance to wear of the woods mounted with the grain running up and down.

Wire life is protected by reducing friction of the wire on the glass-like surface of the covers and the absence of damaging grit or splinters. The design of Emerson Suction Box Covers helps to keep the wires flat, thereby reducing friction drag and power to operate.

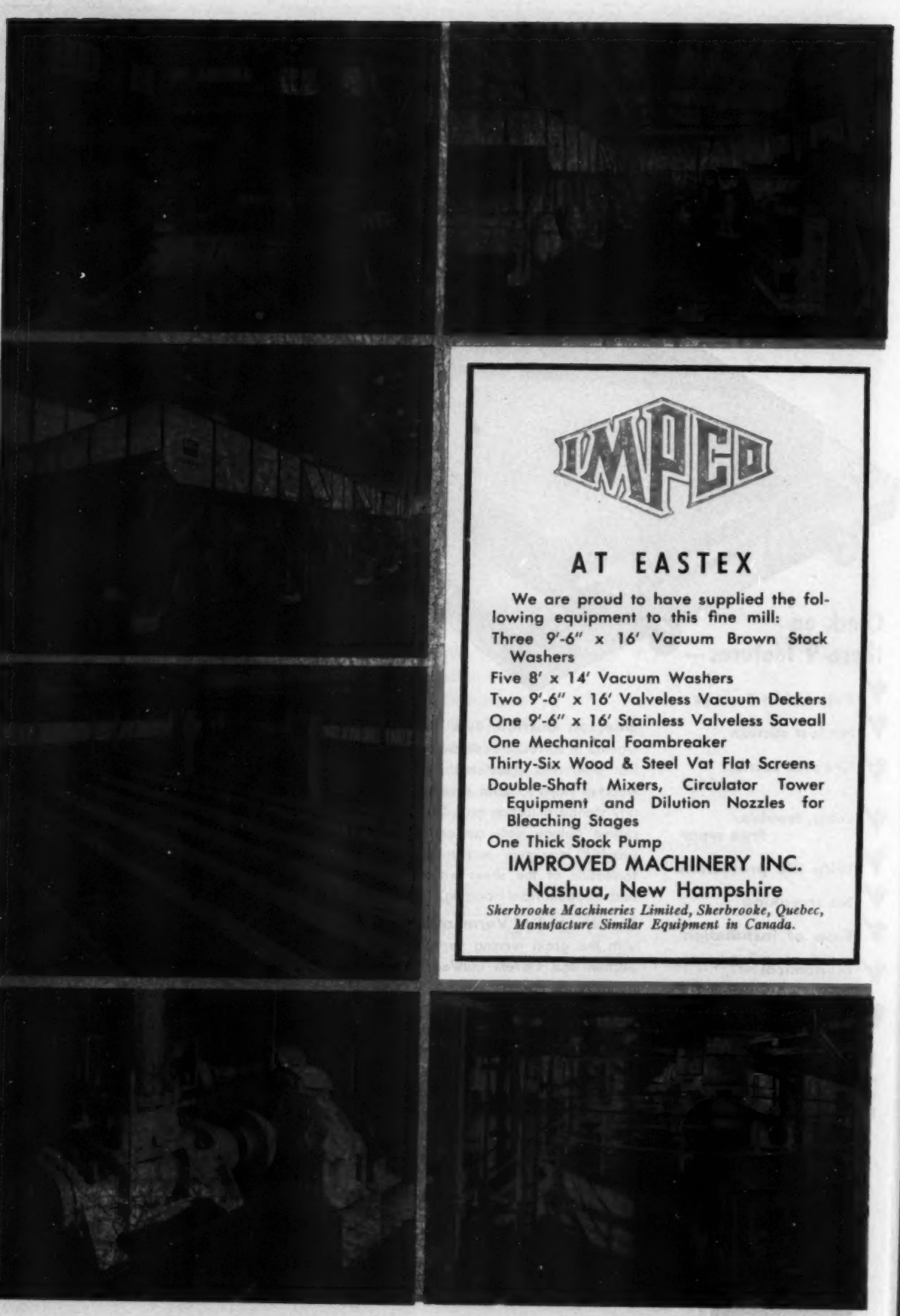
Emerson Suction Box Covers are easy to install, easy and economical to replace. Once the complete cover is installed on the suction box, refill sections may be purchased at about half the original cost, slipped into place and locked in the installed rails by adjustable jack screws on each end.

The next time you need Suction Box Covers, consider Emerson—made for Wire or Felt. For tapered boxes. For wide boxes, multiple covers that will not sag or raise. For quick sheet formation, slotted type covers for maximum drainage. Other special applications.

The Emerson Manufacturing Co.

Division of John W. BOLTON & Sons, Inc.

Lawrence, Massachusetts, U. S. A.



IMPCO

AT EASTEX

We are proud to have supplied the following equipment to this fine mill:

Three 9'-6" x 16' Vacuum Brown Stock Washers

Five 8' x 14' Vacuum Washers

Two 9'-6" x 16' Valveless Vacuum Deckers

One 9'-6" x 16' Stainless Valveless Saveall

One Mechanical Foambreaker

Thirty-Six Wood & Steel Vat Flat Screens

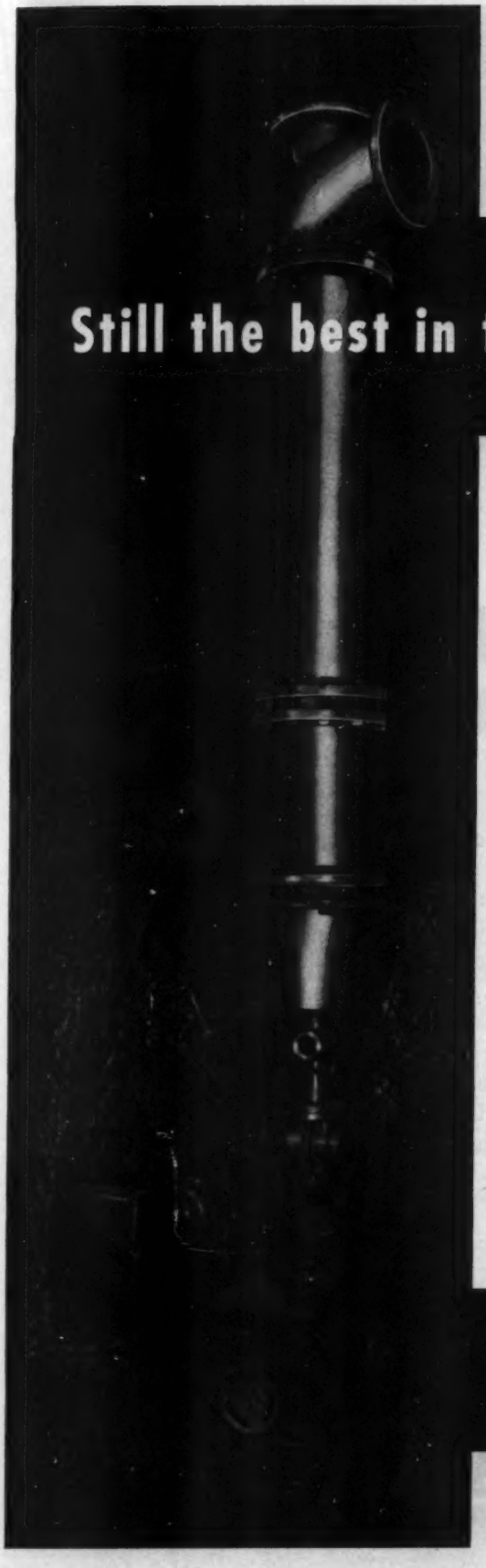
Double-Shaft Mixers, Circulator Tower Equipment and Dilution Nozzles for Bleaching Stages

One Thick Stock Pump

IMPROVED MACHINERY INC.

Nashua, New Hampshire

Sherbrooke Machineries Limited, Sherbrooke, Quebec, Manufacture Similar Equipment in Canada.



after 8 years

Still the best in the paper board field!

VORTRAP®

Classifiers

For Clean Waste Papers

In 1947 Nichols pioneered in centrifugal cleaning of waste paper stock by developing and introducing the large Vortrap provided with positive, foolproof, practical means for Dirt Removal,—The Nichols Automatic Rejects Valve. The original purchasers are still our biggest boosters.

- **Vortraps are standard equipment for filler stock preparation systems.**
- **Nichols rotary type valve insures trouble free ejection of foreign material without plugging and with a minimum of maintenance.**
- **Lowest power requirements in the field.**
- **3,500,000 tons/year of waste paper stock cleaned with Vortraps and automatic rejects valves.**

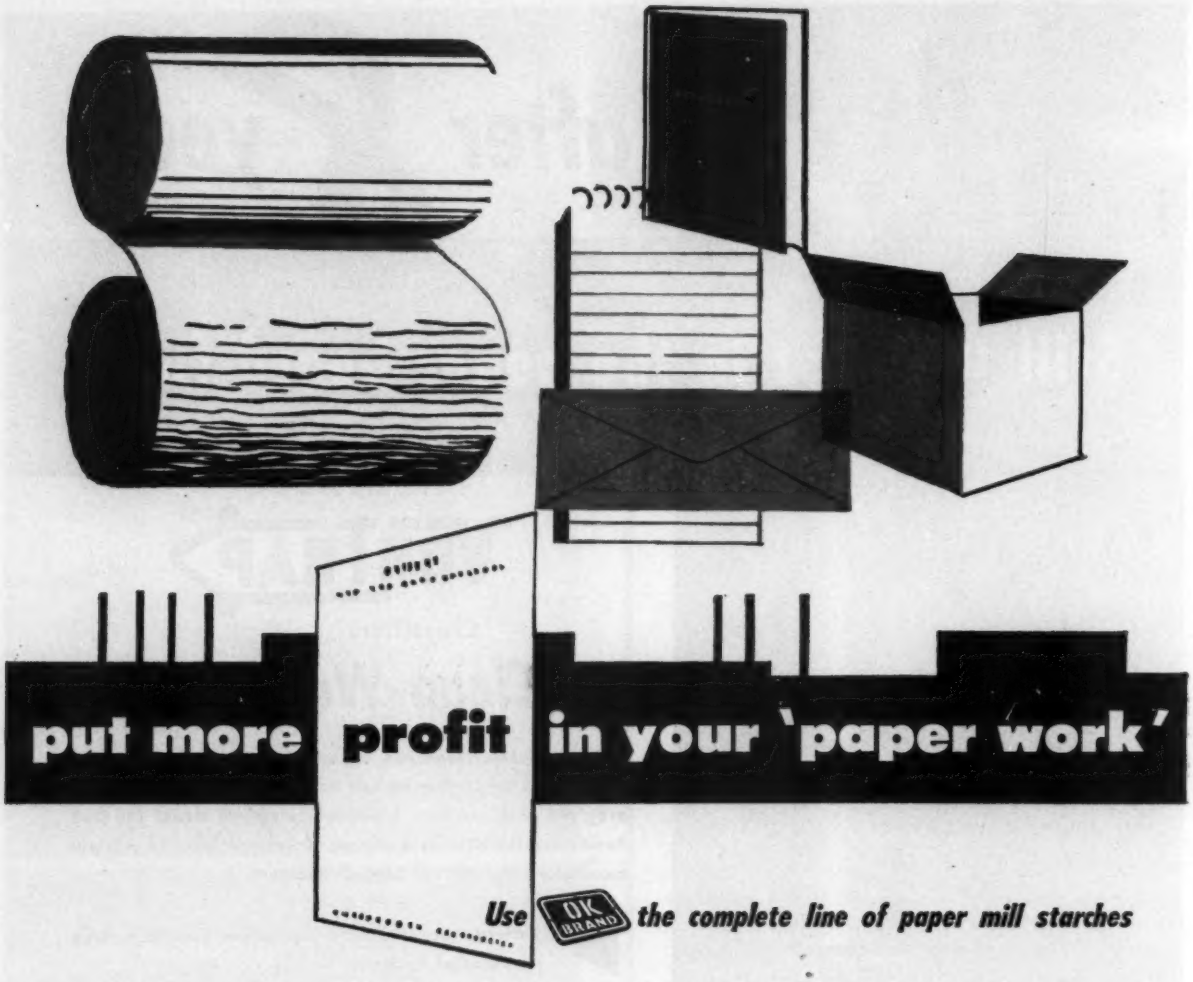
Why be satisfied with less than the best? As many mills are now doing, replace troublesome and less efficient equipment with Vortraps. There is no substitute for experience.

Nichols Engineering & Research Corp.

70 PINE ST., NEW YORK 5, N. Y.

1477 Sherbrooke St. W., Montreal 25, Canada

A. H. LUNDBERG INC., 308 Orpheum Bldg., Seattle, Wash.
H. E. INGALLS, 25 Commercial St., Portland, Me.
DOUGLAS ROBBINS & CO., Minooka, Ill.



The superior quality of OK BRAND starches gives you improved tub, beater, and calender sizing. Better for coating and adhesives, too. When you make better paper at no extra cost — you've put more profit in your "paper work". Try OK BRAND and see! Discuss your special starch requirements with Hubinger's expert technicians.

the stamp of quality

ESTABLISHED IN 1881
THE HUBINGER COMPANY
KEOKUK, IOWA

New York • Chicago • Los Angeles • Boston • Charlotte

OK BRAND

Try these top-quality starches for paper makers:

- OK BRAND Pearl
- OK BRAND E-Type Pearl
- OK BRAND Pearl 700
- OK BRAND Pre-Jel
- OK BRAND Thin Boiling Starch
- OK BRAND Oxidized Starches

Here's industry's most comprehensive line of WORM GEAR DRIVES

Reel at the wind-up end of paper machine is driven through a dependable Link-Belt Worm Gear Drive.

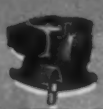
Type WB — Single reduction, worm below gear, horizontal output shaft.

Type WV — Single reduction, vertical output shaft (up or down).

Type HWB — Helical gear first reduction, worm gear final reduction. Worm below gear, horizontal output shaft.

Type HWV — Helical gear first reduction, worm gear final reduction. Vertical output shaft (up or down).

Type DWB — Double worm reduction gear, horizontal output shaft.



Type DWV — Double worm reduction gear, vertical output shaft (up or down).

Type WVS — Single reduction, worm on top of gear, horizontal shaft with screw conveyor flange.

Type WVT — Single or double reduction overhead conveyor drive.

FOR efficient, high-ratio, right-angle speed reductions, choose from the complete Link-Belt line of worm gear drives. A wide selection of single-worm, double-worm and helical-worm gear reductions assures you of the best drive for large and fractional horsepower requirements.

All three types are available with horizontal and vertical housings to permit convenient, compact connections to prime movers and driven machinery. And a choice of two shaft diameters facilitates direct connection or the accommodation of heavy overhung loads.

Single Worm Gear Drives are offered in ratios from $3\frac{1}{10}$:1 to 100:1 with output capacities up to 97.9 hp.

Helical Worm Gear Drives are available in ratios from 26:1 to 540:1 — output capacities up to 56.7 hp.

Double Worm Gear Drives have ratios from 26:1 to 8000:1—output capacities up to 26 hp and 124,800 inch pounds torque.

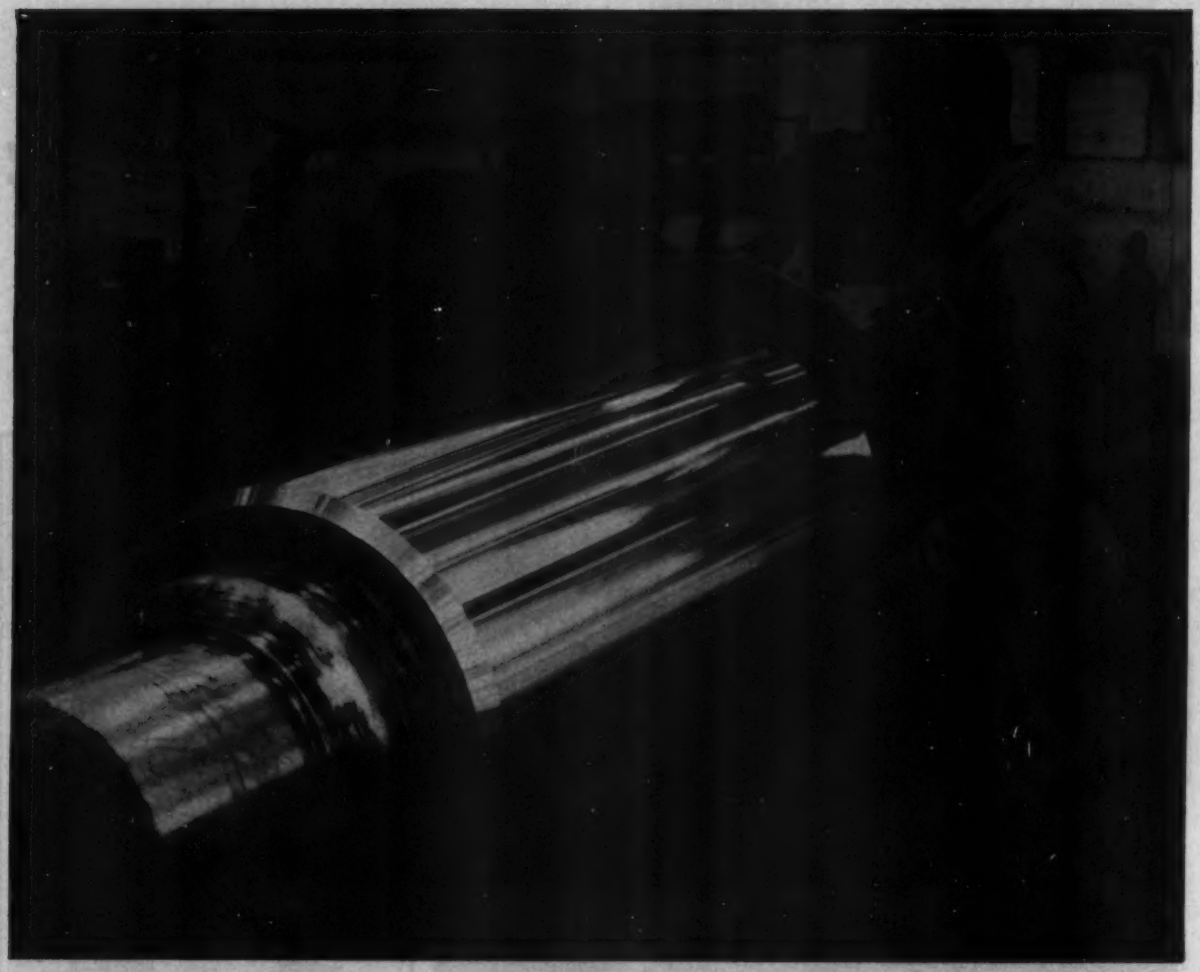
Get all the facts on Link-Belt Worm Gear Drives. Contact your Link-Belt office or authorized stock-carrying distributor. Or write today for Book 2324-A.

LINK-BELT

ENCLOSED DRIVES

TE.675

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.



MIDVALE STAINLESS STEEL ROLLS

FORGED FOR EXTRA SERVICE... MACHINED FOR BETTER FINISHES

For rolling paper or board . . . from 48 inches to 228 inches across the face . . . higher pressures, faster speeds and wet, corrosive conditions . . . Midvale Rolls are forged to meet them all and provide extra service life with fewer regrinds.

Midvale quality starts with the forging; finest specialty steel, expert heat treating, precision machining and grinding. Midvale Roll performance has been proved in leading mills from coast to coast on wet-end or finish-end calenders or super-calenders.

Whatever your needs in rolls why not consult us? Fine mirror finishes can be furnished to any hardness up to 100 Shore for forged alloy and 70 miminum Shore for stainless steel. Midvale can also supply corrugated and embossed rolls of any size and hardness. Take the first step toward the savings you can realize with Midvale Rolls . . . send for your copy of the folder on hardened and ground rolls.

THE MIDVALE COMPANY-Nicetown, Philadelphia 40, Pa.

Offices: New York, Chicago, Pittsburgh, Washington, Cleveland, San Francisco

MIDVALE

FORGINGS, ROLLS, RINGS, FLANGES, CORROSION AND HEAT RESISTING CASTINGS

E. A. Hamann (left), Power Generation Engineer and Robert Best (right), Superintendent of Utilities, go over lubrication records with Bill Schall, Standard Oil lubrication specialist. Bill Schall has been providing technical sales service to Standard Oil customers since 1943. Bill is an engineer with a B.S. in engineering from Georgia Tech., and a graduate of Standard's Sales Engineering School. Customers of Bill's find this experience and background pay off for them.

Anheuser-Busch still using same turbine oil after 24 years

For more than 24 years the Anheuser Busch Brewery, St. Louis, Mo., has been operating two 3,000 kw., turbines using NONPAREIL Turbine Oil. Three more turbines added to the system in 1940, '48 and '51 have also used NONPAREIL since beginning operations. The reason for choosing NONPAREIL is clear; it is guaranteed for the life of the turbine.

Since the initial installation, Anheuser Busch has not had to replace a NONPAREIL Turbine Oil fill. Neutralization number is always far below 0.15 mg. KOH/g., the degree of acidity Standard Oil guarantees NONPAREIL

. . . NONPAREIL

will not exceed. At nearly all times neutralization number is on the order of 0.03 mg. KOH/g. (See chart).

In all these years, oil systems have remained clean. There has been no problem of oil acidity in any of the five turbines. The delicate art of brewing world famous Budweiser goes on without concern over power failure due to lubrication failure.

Like to know more about NONPAREIL and its possible use in your turbines? In the midwest call your nearby Standard Oil lubrication specialist. Or, contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Anheuser-Busch Turbine Lubrication Record

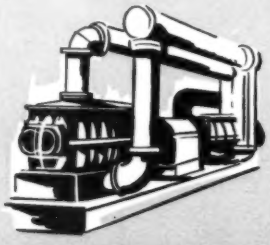
Generator Capacity	Start up and NONPAREIL Installation Date	Date of Last Oil Analysis	Neutralization Number
3,000 kw.	Oct. 2, 1930	July 20, 1954	0.03
3,000 kw.	Oct. 2, 1930	July 22, 1954	0.02
2,500 kw.	June 10, 1940	July 20, 1954	0.03
7,500 kw.	Jan. 2, 1948	July 22, 1954	0.03
7,500 kw.	July 26, 1951	July 22, 1954	0.01

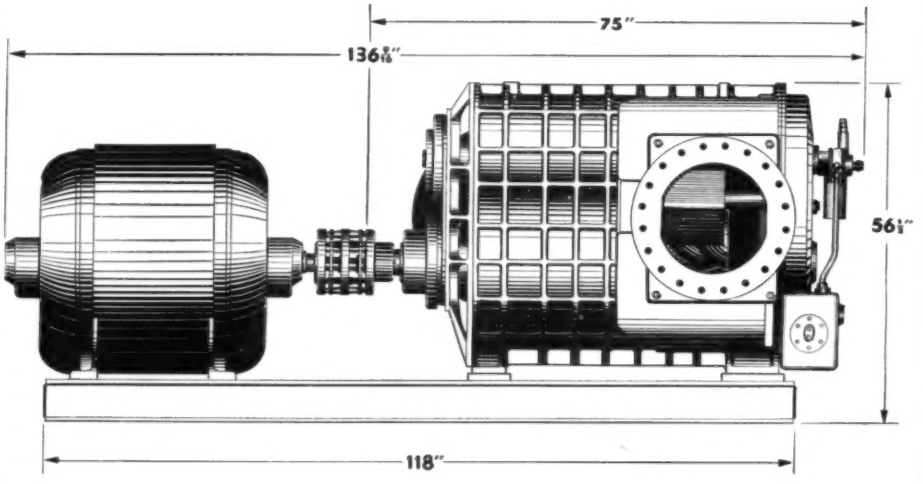
STANDARD

STANDARD OIL COMPANY
(Indiana)

Vacuum Pump Users:

why use two-





400 HP motor
1200 RPM

Standardaire 175x32 Vacuum Pump
75 inches in length, weighs approximately 8,000 lbs.

WHEN ONE WILL DO!

A *Standardaire* Vacuum Pump with low horsepower and single-stage simplicity will do the same job for you as most double-stage pumps . . . at less cost.

For example, the *Standardaire* 175x32 Single-stage Vacuum Pump operating at 1200 RPM is conservatively within the range of a 400 HP motor and gives the following tested CFM capacities—

20" HG	*22" HG*	*24" HG*
8,800 CFM	8,600 CFM	8,300 CFM

Figure what this means to you in savings. You can cut production costs, and save on floor space, too. This is possible because the rugged, compact *Standardaire* offers you greater capacity per pound of pump with less horsepower consumption.

Should you wish to stage two *Standardaires*, the same high capacities are achieved with approximately 25% saving in horsepower.

What's the secret behind the *Standardaire* capacities? Simple, rugged construction and *Standardaire's* exclusive, cycloidal screw-type rotors which compress air in a wide range of pressures with a minimum of internal leakage.

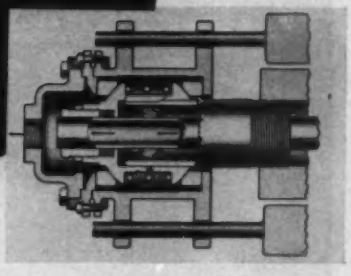
The *Standardaire* is essentially a dry-type vacuum pump, using a very small quantity of water for temperature control.

There's a *Standardaire* Vacuum Pump designed to meet your exact requirements. Get all the facts today, write . . .

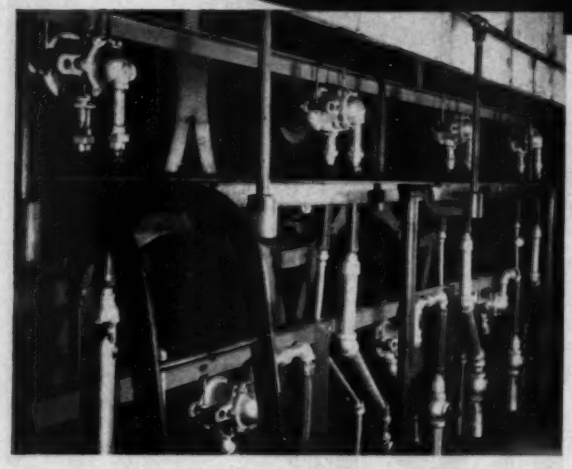
READ STANDARD
CORPORATION

BLOWER-STOKER DIVISION
370 Lexington Avenue
New York 17, New York

Type LN JOHNSON JOINTS



Cross section view of Type LN. Inlet is in side of body; outlet can be as shown or with angle head as in installation views.

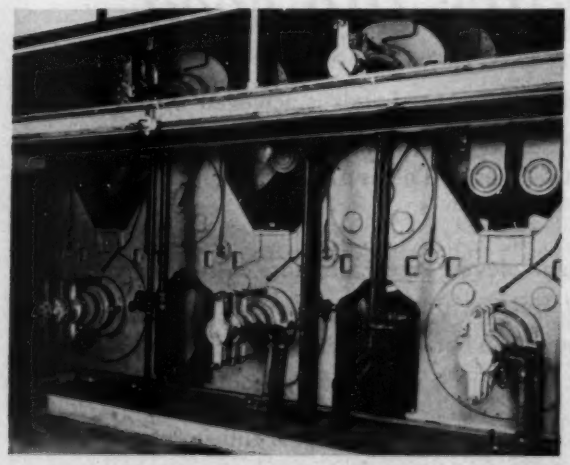


Type LN Johnson Joints on paper machine with exposed gearing. Support rods are hung from framing.

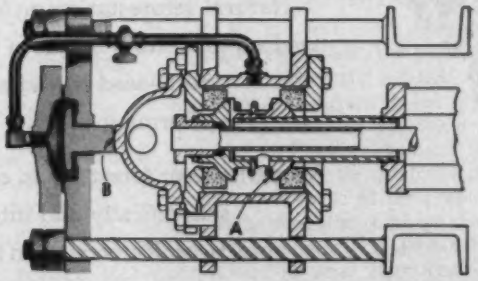
SYPHON PIPES that must rotate with the dryer roll require a specialized type of steam joint. The Johnson Type LN answers the problem neatly enough by accommodating the syphon pipe as an integral part of the rotating assembly. The pipe is still permitted longitudinal movement; the Johnson Joint requires no lubrication or adjusting.

The mounting of the Type LN provides a "floating action" that assures maximum service life. Simple rods, which fit into lugs cast on the joint body, carry all the weight of the body and connections. The sealing mechanism floats freely inside.

Months and even years of service without a bit of attention have proved the Type LN the best steam fit yet devised for this service. A trial joint installation can be arranged in your own mill, without any obligation on your part.



Type LN Johnson Joints on machine with enclosed gearing. Support rods are fitted to bosses provided by machinery manufacturer. Installation includes Compensators (see right).



The Johnson Load Compensator

Developed in response to increasing operating speeds and pressures. Teams up with the LN Joint; mounts on same support rods. Utilizes pressure within joint to exert a force against joint body, which in turn reduces friction load at the seal ring. Cuts power needs of joint in half; doubles seal ring life; slashes down time and maintenance.

Products of The
845 Wood St., Three Rivers, Michigan
Rotary Pressure Joints • Compressed Air Separators and Aftercoolers
Direct Operated Solenoid Valves • "Instant" Steam Water Heaters

NATURE
sows the seed

Natural reforestation on Weyerhaeuser Timber Lands is achieved with seed supplied from blocks of trees reserved during logging and left standing to re-seed the adjacent cut-over area. This is a basic principle of Tree Farming.

Weyerhaeuser forest lands, consisting of eleven Tree Farms, are *cultivated* scientifically and intensively in line with the best possible forestry practices. Reforestation keeps pace with harvesting. Re-seeding of cut-over land *now* assures a timber crop that is sufficient and continuous.

Researchers are each day finding new uses for woodpulp. A full supply from Weyerhaeuser Tree Farms will *always* be available as a result of planned timber crops and a helping hand from Weyerhaeuser foresters.

WEYERHAEUSER

CURRENT COMMENTS

Hurricane Diane hits hard . . . the public trust . . . and the hot seat

An appraisal of the damage suffered by the paper industry during the August hurricanes shows a heavy loss to mills in Massachusetts, New Jersey and Connecticut. However, the paper manufacturers suffered slight losses in comparison with the devastation experienced by the various small industries in the Connecticut river valleys, including the Connecticut itself and its subsidiaries. Possibly the heaviest loss was to Stevens Paper Mills Inc., whose officials estimate damage at approximately $1,000,000 at Westfield, Mass., with less severe losses to its mills in South Hadley Falls, Mass., and Windsor, Conn.

The heaviest losses to all mills except Stevens were principally due to inventory ruined by water and also water damage to electrical installations. In New Jersey, mills of Riegel Paper Corp. suffered from flood damage. Connecticut mills escaped with relatively small loss from water. Massachusetts mills, then, were hardest hit. In addition to Stevens, Marcallus Mfg. Co. Inc. (formerly American Tissue Mills Inc.) at South Hadley was so severely damaged that it is feared that operation may never be resumed. Strathmore Paper Co. at West Springfield was temporarily shut down by loss of power because of a broken dam. Other damaged plants included Westfield River Paper Co. Inc. at Russell, Mass.; Kupfer Bros. Co. at Northbridge; Bird & Son inc. at East Walpole, and Tileston & Hollingsworth Co. at Hyde Park. Except for American Tissue, however, the mills were able to resume operation with a minimum of delay. And in fact many are now in full operation. In the Holyoke and other regions there was some difficulty due to the inability of mill employees to return to work because of isolation by high water. Dirty water in the plant was a problem for all the mills.

Meanwhile, however, paper mills that have suffered damage have been classified by Washington as essential defense installations and will be able to secure federal aid in returning to normal operation. Allocations will be made according to individual needs.

To avoid the barbs

The campaign aimed at the use of dollar-a-year men by government may be followed by a normal tendency by businessmen to reject requests for their assistance as voluntary government employees. None, as far as is known, has as yet actually refused to accept such positions, but the normal tendency is to avoid the barbs hurled in the general direction of businessmen in government. There is a feeling that Commerce Secretary Sinclair Weeks was a little less than appreciative of their services when he failed to come to the defense of businessmen who have made patriotic sacrifices to accept government jobs without compensation. On the contrary, they note, the Department has issued a code of ethics based on the theory that public office is a public trust applicable alike to career employees and businessmen in temporary positions. It is explained in defense of the Department that this is merely phrasing a policy that has existed for nine years. But, it is worthy of note that the code was promulgated soon after complaints by so-called liberal-minded men in Congress against the use of businessmen in government agencies.

Of the 25 industry divisions in Commerce, 15 are manned by businessmen known as "W. O. C." employees, serving the government while retaining their salaries from their home firms. It is not denied that these men, particularly in the divisions affecting pulp and paper, have done a most important job in serving the government without favor to their own industry or companies, and their experience has been of untold value to the government. This is the latest development in what has been called a demand by government for second-class citizen's to handle the world's biggest business.

The hot seat for Gresham

The Office of Defense Mobilization has named an experienced career man to function under the new Reciprocal Trade Agreement Law, under which the President is authorized to adjust duty rates on imported commodities in cases where such commodities are of the type classified by the law as essential to national security. Harold Dean Gresham has been named to head up this program for the eventual determination of the essentiality of various commodities. He was transferred from the Central Intelligence Agency, where he had been an economist. (Mr. Gresham at one time held a similar position with the Tariff Commission.)

Proponents of a free trade system have claimed that the provision for special duty consideration for sensitive commodities was placed in the law as a means of satisfying the certain industries that have been demanding greater tariff protection. In his new position, Mr. Gresham will be in a hotter seat than at any time during his 23 years of government service.

Up 2,500,000 tons

While business is on the upswing in nearly every field, the paper industry has surpassed the national average in output. Production in the first half of the year was 11.6 per cent over the first half of 1954, as against a gain of 8.8 per cent for all durable and non-durable industries. At the present rate of production, the tonnage for the year will be nearly 29,000,000 tons, or 2,500,000 tons over the output during the first half of 1954.

While the economists estimated a 7 per cent increase in 1955 over 1954, their figures are now known to have been over-conservative. Production is close to 100 per cent, many mills now operating seven days per week. In the face of heavy demand prices have remained relatively stable. Some slight increases have been announced, but none was sufficient to meet the increasing cost of materials and labor. As always, the industry has considered it better business to hold cus-

Jones

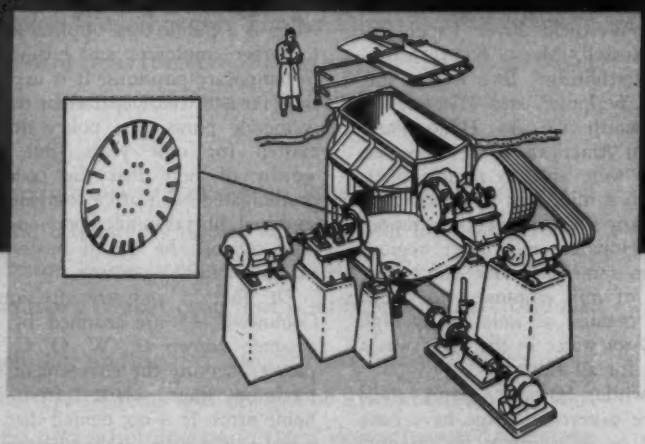
HI-LO PULPER

Completely defibers in less than half the time of conventional pulpers.

Here's the answer to the problem of pulping waste news, wet-strength broke, and other hard-to-treat material.

The unique feature of the HI-LO Pulper is its *two* rotors . . . a large-vaned Lo-Speed one for initial break-up and thorough circulation; a small-vaned Hi-Speed one for complete defibering in minimum time with most efficient use of horsepower.

The HI-LO, will completely separate fibers without cutting. Actual tests show substantial improvement in tear; and in many cases, it will produce treatment on wood pulps superior to a Hollander Beater. Ask your Jones representative for details, or write for Bulletin No. EDJ-1063.



E. D. Jones & Sons Company
Pittsfield, Massachusetts
BUILDERS OF QUALITY STOCK PREPARATION MACHINERY

Jones

In Canada:
The Alexander Fleck, Ltd., Ottawa

Current comments . . .

tomer good will rather than to extract distress dollars from those in need of its product.

Financial Reports

Paper mill securities forged upward to keep pace with the increase in stock market averages into early September, when the average was higher than for any year since 1929.

Net Incomes

A.P.W. Products Co. — Net income for twenty-six weeks ended July 3 was $69,857, as compared with a deficit of $59,714 for the comparable period a year ago.

Celotex Corp. — Net income for nine months ended July 31 was $3,275,840, as compared with $1,958,669 for the comparable period a year ago.

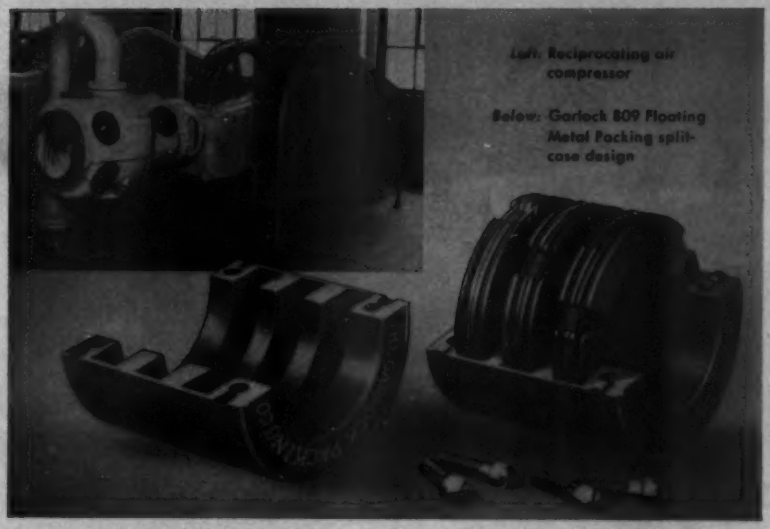
Champion Paper & Fibre Co. — Net income for the quarter ended June 30 was $2,771,120, as compared with $2,387,209 a year ago.

Cornell Paperboard Products Co. — Net income for six months ended June 30 was $621,346.

Stock and Bond Quotations

New York Stock Exchange — Stocks		
Closing Prices	Sept. 9, 1955	Aug. 10, 1955
A.P.W.	5	*5¼-5⅜
Celotex	35⅝	30⅜
Same Pref.	19⅛	*19-19½
Certain-Teed	27½	25½
Champion P & F	54	53½
Same Pref.	106	*107½-108
Chesapeake Corp.	59	53-53¼
Container Corp.	70½	66
Same Pref.	...	*101½-102
Crown Zellerbach(new)	56¾	77¾(Old)
Same Pref.	103½	103½
Dixie Cup	55	52½
Eastern Corp.	29	*27½-27¾
Federal Paper Board	33¾	31¾
Robert Gair	29⅛	29¼
Gaylord Container	54⅛	50
Great Northern	86	82½
Hammermill	33¼	33⅛
International	108	104½
Same Pref.	...	104½
Kimberly-Clark	51⅜	49⅛
MacAndrews & Forbes	51⅛	51
Marathon	32⅛	31½
Masonite	29⅛	28½
Mead Corp.	62⅛	53¾
Same Pref.	...	*101¼-103
Same Sec. Pref.	70	65⅛
Minnesota & Ontario	67	62¼
National Container	21	19⅛
Same Pref	36	33½
Oxford Paper	40¾	39
Same Pref.	100⅞	100
Rayonier Inc.	38¾	34½
Rhinelander	37⅛	35¾
Scott Paper	73¼	69⅛
Same $3.40 Pref.	95½	*95½-97
Same $4.00 Pref.	...	*102-104
St. Regis	42⅛	40⅛
Same Pref.	...	*102-103
Sutherland	46¾	47½
Union Bag & Paper	96	93¼
United B. & C.	24⅝	*24-24½
United Wall Paper	2¼	2⅛
Same Pref.	22	*19½-20
U. S. Gypsum	295½	268
Same Pref.	178¼	*181-182
West Va. P. & P.	47½	44
Same Pref.	106⅝	106⅞-107⅛
New York Stock Exchange — Bonds		
Celotex 3¼%	...	99½
Champion P & F Co. 3¼%	...	...
Mead Corp. 3%	...	...
American Stock Exchange — Stocks		
American Writing	20½	19½
Brown Company	17¼	17⅛
Puget Sound	64½	59

*Closing Bid and Asked Prices.



Left: Reciprocating air compressor

Below: Garlock 809 Floating Metal Packing split-case design

For air compressors, users report

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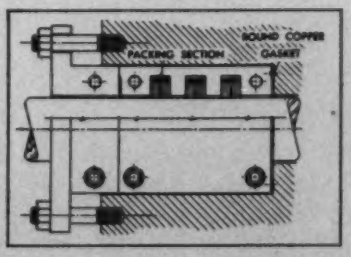

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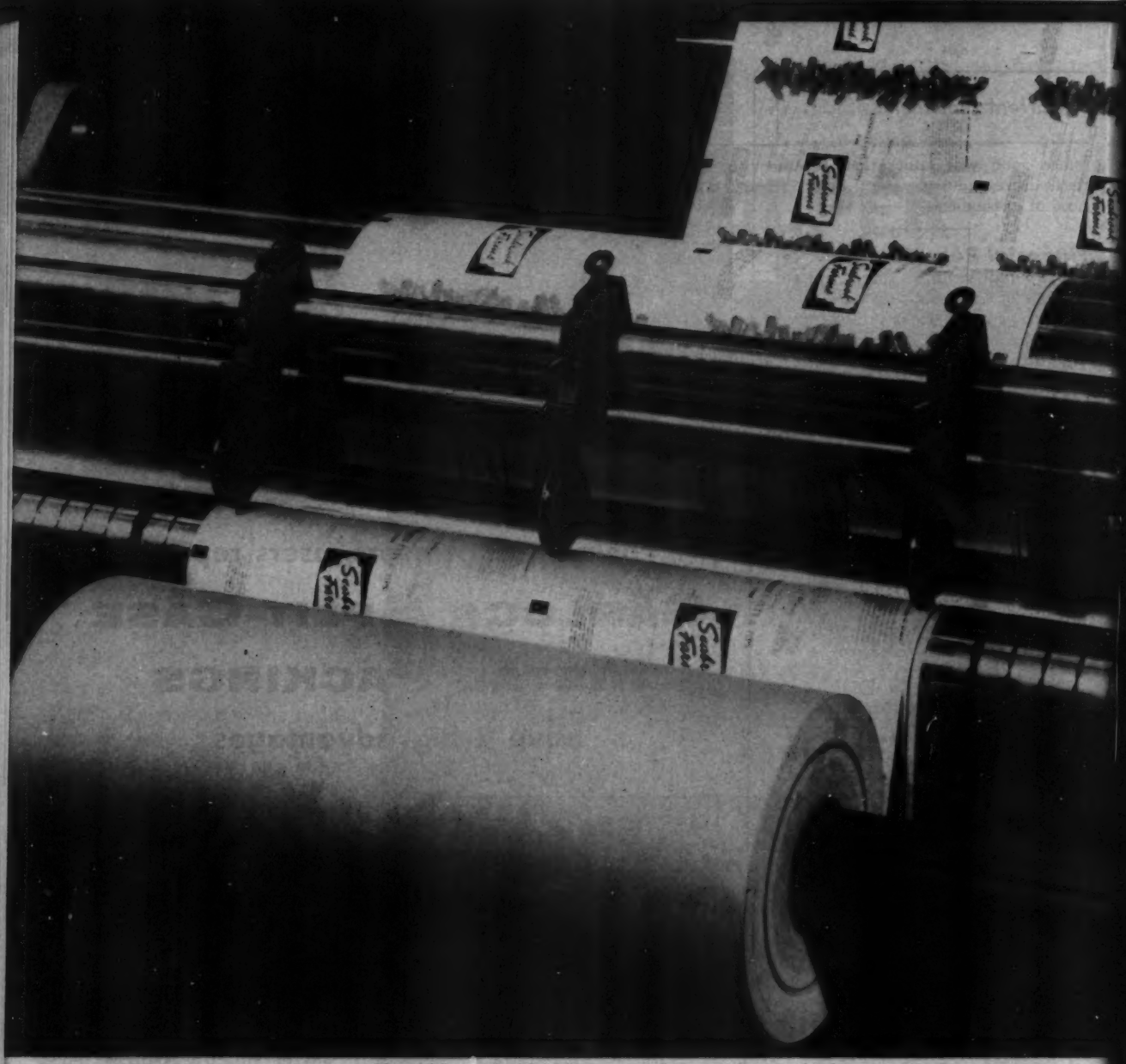

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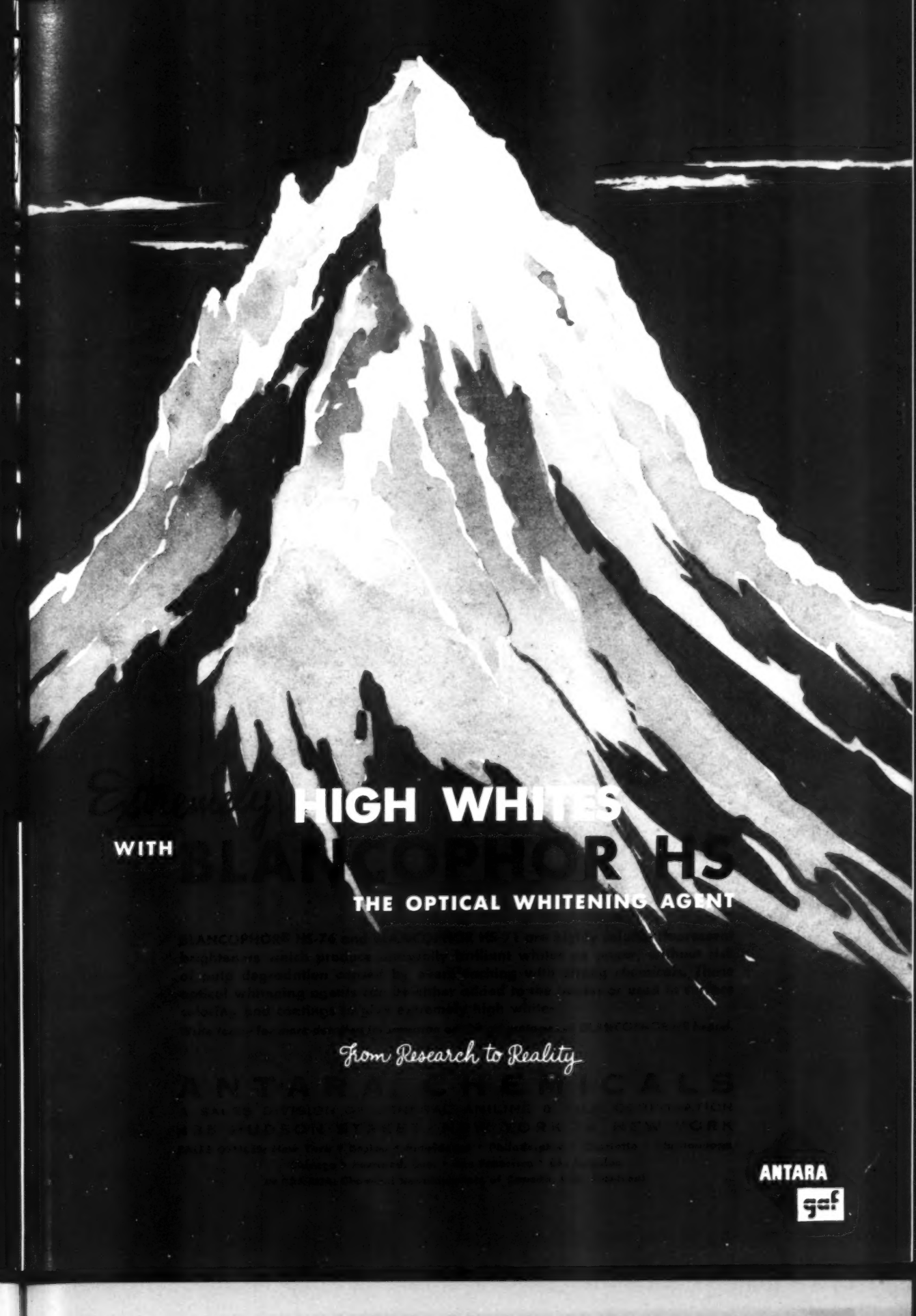
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The Paper Industry

OCTOBER 1955

To chemistry go the laurels

FOLLOWING THE development of the fourdrinier in 1798 and the cylinder machine in 1809, a preponderance of major impacts on the subsequent growth of the pulp and paper industry has come through chemistry. The chemical impact started with the introduction of the soda-pulp process in the second half of the 19th century. This process opened a new fiber source, wood, to the pulp and paper industry and thereby made the latter independent of rags for paper making purposes. Other pulping processes dependent on chemicals soon followed, and chemicals also became increasingly important in the improvement of paper grades, the development of new paper products, and the discovery of new applications for paper products.

Today, as pointed out by Robert Frank and John B. Calkin in the September 24, 1955, issue of "Chemical Week", the U. S. paper industry is spending about $250,000,000 on chemicals annually. For every ton of paper produced, with the exception of newsprint, some 500 lb. of chemicals are consumed at various points of the papermaking process.

Current annual consumption of some of the basic chemicals is given as 500,000 tons aluminum sulfate, 40,000 tons ammonia (with a tremendous increase potential), 180,000 tons caustic soda, 330,000 tons chlorine, 1,000,000 tons clay, 750,000 tons lime, 80,000 tons rosin, 875,000 tons salt cake, 315,000 tons soda ash, 280,000 tons starch, 440,000 tons elemental sulfur, 30,000 tons sulfuric acid, and 9,000 tons wet strength resins.

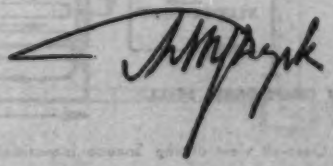
The industry's indebtedness to chemistry will be even more complete with the realization of the pulp and paper industry's dream of complete wood utilization. With only 50 per cent of the wood used and 50 per cent being lost in the waste liquor, the urgent problem is to find an inexpensive way to turn these wastes into saleable products or chemicals. While the pulp and paper industry could never hope to compete with petrochemicals in the output of chemicals, the importance of the solution of the problem would be in handling the waste disposal problem more economically and possibly in some cases, where conditions are extremely favorable, with moderate profit.

Considerable strides in the recovery of products and chemicals from waste liquor have already been made. Among the more recent developments in this connection are the facilities which are being erected by Crown Zellerbach for the recovery from sulfate black liquor of 2,000,000 lb. dimethyl sulfide annually. Dimethyl sulfide can be used in organic synthesis for the production of a variety of products. The company is also testing Conidendrol, a non-toxic product obtained from hemlock waste liquor, as an anti-oxidant in the preservation of edible oils, fats, and also rubber, etc. Experiments are also being made in incorporating Conidendrol in paper products used for packaging oleomargarine, butter, and other foods easily susceptible to rancidity.

Furthermore, Crown Zellerbach has just opened a new research laboratory at Camas, Wash., (described elsewhere in this issue) which will accelerate the company's search for new products and a more complete utilization of wood.

Of inestimable value in shaping future progress in the pulp and paper industry is also the thorough symposium on "Carbohydrate Constituents of Pulps and Pulp Sources" held at the 128th meeting of the American Chemical Society in Minneapolis. This symposium is lucidly and succinctly summarized by Dr. Louis E. Wise and published elsewhere in this issue. It deals mainly with the hemicelluloses the importance of which, while ignored several decades ago, has now been recognized in their effect on paper properties.

While perfect papermaking lies a long way ahead, we can be sure that chemistry will show us the approaches to it.



Bio-oxidation plant

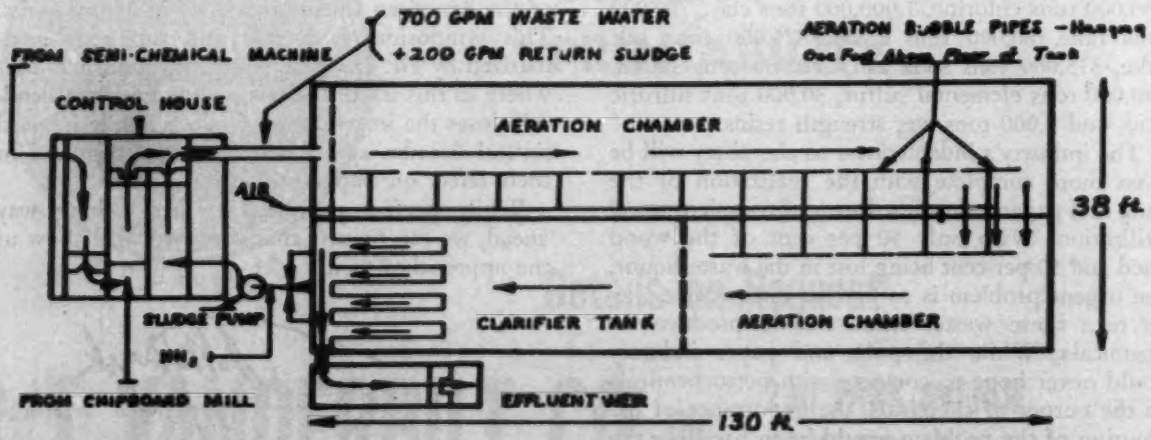
Sonoco Products Co.'s bio-oxidation plant*

B. M. REAVES**
Engineer
Sonoco Products Co.
Hartsville, S. C.

SONOCO PRODUCTS Co. completed in March its first year of operating a 1,000,000-gal./day bio-oxidation pilot plant for treating paper mill waste waters. This is a case history of the plant, telling how and why a plant of this particular type and size was selected, its design, construction, and the good and bad results of the first year of operation.

Sonoco's primary products are paper cones and tubes used as yarn and thread carriers in the textile industry. The company also manufactures a variety of cores for use in the paper industry. A relatively new, but fast growing product is the spirally wound paper tubes used in the construction trade for circular concrete column forms, voids in concrete slabs, and air duct in perimeter heating installations. To supply the paper for these products, there are eight cylinder machines which produce numerous varieties of chipboard, mostly from waste news and corrugated boxes. Production from these eight machines ranges from 300 to 350 tons per day. The com-

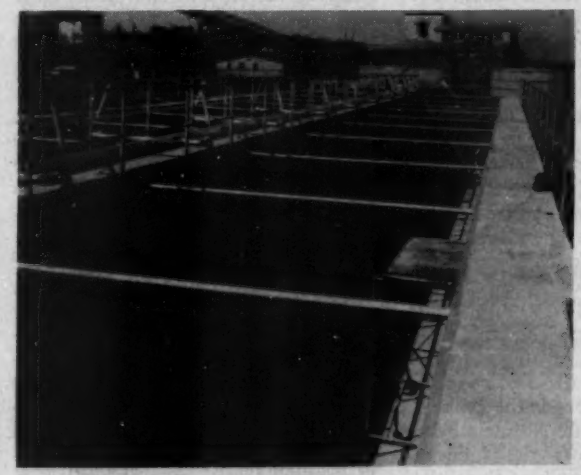
*Presented at a meeting of the Southeastern Section of Tappi, May 13 in Savannah, Ga.
**With the assistance of Dr. J. E. Copenhaver, chief chemist, and C. Nevin Betts, paper mill chemist.



Over-all view of the Sonoco bio-oxidation plant shows control house; weirs (on top of house), and aeration-clarifier tank

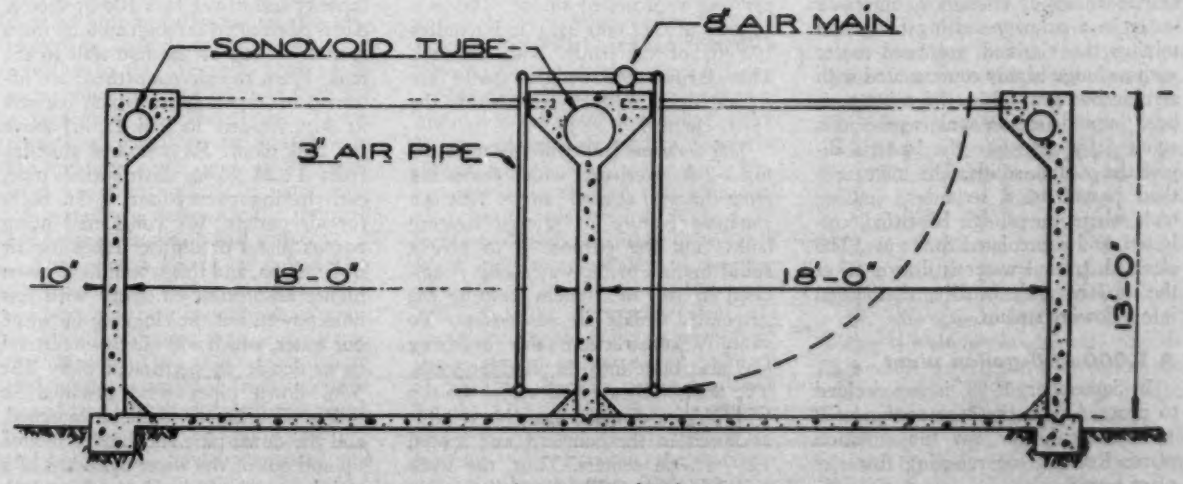
Weirs atop the control house include (l to r) recirculated sludge weir, chipboard weir, semichemical weir

View of the interior of the aeration tank and clarifier, with the latter in the right foreground



Air distribution pipe is shown in this view looking toward the influent end of the aeraton tank

Aeration tank in operation. Clarifier is at the far end of the left channel



Cross-section of tank

pany also has one Fourdrinier machine producing nine-point corrugating board from neutral sulfite semichemical pulp. Production from this machine is approximately 135 tons per day and is all sold to an outside customer. The receiving stream at our plant is known as Black Creek. It has a flow varying from a high of 485 c. ft. per sec. to a low of 102 c. ft. per sec., while its average flow is 250 c. ft. per second.

In a manner that is familiar to the paper industry as a whole, Sonoco has long been "closing up" its paper machine water systems by developing the re-use of white water and installing equipment to recover the suspended solids. This program has successfully lowered our per cent loss of suspended solids from the paper mill from 3.09 per cent in 1942 to 0.92 per cent in 1953, and the gallons fresh water per ton of paper from 40,800 gal. in 1942 to 15,700 gal. in 1953. Despite these improvements, and as plant facilities and production increased, it became evident that additional measures must be taken to lower the pollution load in the waste waters being returned to the stream. It was also evident that we must concentrate on reducing the load caused by dissolved solids in the paper mill waste waters.

Early in 1951 laboratory scale experiments were tried to see if the bio-oxidation process would work on Sonoco's waste waters. The results were favorable. Based on this, it was decided to build a small pilot plant with a flow of 2 gpm. This pilot plant was operated for 4½ months. Again the results indicated that dissolved solids in our waste waters could be successfully treated with the bio-oxidation process.

Fundamentals of the process

The process consists of removing suspended solids from raw, untreated water in a primary settling tank, and mixing the clarified untreated water with a sludge highly concentrated with aerobic bacteria. Then the mixture is held in a detention tank where it is agitated by air while the bacteria digest the soluble solids. The mixture is then passed to a secondary settling tank where the sludge is settled, collected, and recirculated for re-use. The clarified, treated water is drawn off at the surface and, usually, discharged into a flowing stream.

A 1,000,000-gallon plant

In September, 1952, it was decided to proceed with the construction of a 1,000,000-gal. per day bio-oxidation plant. Reasons for selecting this size plant were:

1. It was desired to have a plant with enough capacity that its effect would be felt in the over-all stream pollution picture.
2. We felt that with a plant this size, we could best determine how to integrate its necessarily continuous operation with the normal five day per week operation of the paper mill.
3. With a plant this size, future expansion could be done on a unit basis. We felt this was desirable since it insures partial operation during most mechanical failures, and it also allows certain units to be shut down during winter months when the stream can receive a higher BOD load.

The only available space for a plant site was a section of swampy ground adjacent to the receiving stream. Since this area contained relatively poor foundation soil, we felt it would be cheaper to repair any trouble caused by settling than to install piles on which to build the plant. Approximately one acre of this land was cleared of undergrowth and filled with sand-clay.

It was decided that the aeration and clarifier tanks would be rectangular, of one-unit design, and constructed of reinforced concrete. This developed into a tank 130 ft. long, 36 ft. wide and 13 ft. deep. Water depth is 12 ft. The tank walls are 10 in. thick, and the floor is 6 in. deep. The tank contains two full-width expansion joints through floors and walls. Except for a 10-ft. length at one end, the tank is divided into two 18-ft. channels by a mid-wall. This allows the influent water to travel the length of the tank, make a U-turn, and discharge out the same end of the tank that it entered. The aeration tank is sized to have a retention time of six hours based on a flow of 700 gpm raw influent plus 25 per cent recirculated sludge. This is a volume of 317,000 gal., and requires 195 ft. of the 18-ft. wide channel. The clarifier and aeration tanks are separated by an 8-ft. wall across the 18-ft. channel.

The aeration tank walls have at the top a 2-ft. overhang, which comes out from the wall at a 45° angle. This is a common feature in sewage treating tanks, and the purpose is to give a spiral motion to the water as it is agitated by the air, thereby keeping the suspended solids in suspension. To simplify construction, this overhang was also built into the clarifier walls. The tank walls are tied across the top with 2½-in. diameter extra heavy pipe, anchored in the concrete, and spaced 12½ ft. on centers. Thus, the walls are tied at top and bottom, eliminating any cantilever effect from the water load. The influent and effluent water troughs are formed as part of one end wall. As an economy measure, it was decided to place Sonoco's Sonovoid tubes in the overhang section of the walls — 24-in. diameter Sonovoids were used in the mid-wall and 12-in. diameter Sonovoids were used in the side and end walls. These tubes replaced approximately 25 c. yards of concrete, which represents a saving of over $500.00.

The clarifier tank has the same dimensions as the aeration tank, except the length is 65 ft. This gives a volume of 103,000 gal. and a retention time of 2 hrs. The floor of the clarifier has a 1 per cent slope from the influent end. Settled sludge is collected by means of an American Well Works straight-line collector, which drags the sludge down the sloped floor to three sumps at the effluent end of the tank. The sludge is pumped from the sumps to a measuring weir, from which it flows to the system for recirculation.

The control house is a 20- by 20-ft. building constructed of concrete blocks, with reinforced concrete floor and roof. The house is divided into two sections, one housing the laboratory and instrument panel, and the other housing the air blower, sludge pump, power transformer, switches, and other equipment. The laboratory is equipped with a water still, a constant temperature bath for BOD determinations, and necessary apparatus for performing D.O., BOD, sedimentation, suspended solids, and dissolved ammonia nitrogen tests. We are fortunate in having a flowing well nearby from which a continuous supply of fresh water at 20° C. is available for our constant temperature bath.

The air blower is a U.S. Hoffman centrifugal blower rated at 2000 cfm capacity and driven by a 100-hp motor. Air is distributed through an 8-in. main located on top of the mid-wall in the tank. From the air main there are fifteen 3-in. down pipes which connect to 3-in. headers located 12 in. above the tank floor. Each header contains from 12-24 ¾-in. distribution pipe, each having twenty-four ⅛-in. holes for air outlets. We considered using porous plates or diffuser tubes for air distribution, and this would have given higher absorption efficiency with less horsepower, but the clogging factor of our water, which was unknown, caused us to decide on perforated pipe. The 3-in. down pipes were installed so that a pipe union could be loosened, and the down pipe and header rotated up and out of the water by means of a stainless steel cable and portable winch

located on the opposite wall of the tank. This allows maintenance work to be done on the pipes without draining the tank.

Weirs for measuring influent water from the paper mills and recirculated sludge are located on top of the control house. The weir for measuring effluent water from the treating plant is located on the ground beside the clarifier and is fed by gravity. All weir boxes are concrete.

Included in the plant make-up is a 50,000-gal. wooden tank which is used for storage of black liquor from the semi-chemical pulping operations. The purpose of this is to have a supply of high BOD feed available to the plant for week-ends when the paper mills are not operating.

How the plant operates

The operating cycle for the plant naturally begins in the paper mill. White water from the chip board operations is collected in a surge tank and pumped to a Waco filter. Screened water from the Waco is pumped with a 1000-gpm pump through 900 ft. of 8-in. pipe to a weir on top of the control house. White water from the semichemical operation is collected in a 50-ft. diameter Dorr clarifier, and from here the clarified water is pumped through 700 ft. of 6-in. pipe to another weir on top of the control house.

The flow of semichemical water is intermittent, with the paper machine system getting first chance to use the water for stock preparation. A manual valve was first used to maintain a maximum peak flow of semichemical water, but has since been replaced by a diaphragm-operated butterfly valve. This valve is controlled by a recording controller sensitive to the hydraulic head over the semichemical weir. From here, the semichemical water flows by gravity into the chip board weir. The flow of chip-board water is also controlled by a butterfly valve which is sensitive to the hydraulic head on its weir. Since this flow includes both the semichemical and chip board waters, there is a control on the total flow to the treating plant, and at the same time, variations in flow of semichemical water are automatically compensated for with chip board water.

The influent waters are mixed with the recirculated sludge in a small mixing box, and the mixture flows by gravity into the aeration tank and on into the clarifier. The collected sludge in the clarifier is pumped from the three sumps by a 400-gpm centrifugal pump to the sludge weir on top of the control house. This flow is measured and recorded.

Originally, sludge flow was controlled with three manual valves on the suction lines from the sumps, but it proved very difficult to keep equal suction pressure on each line, and this caused clogging in the pipes. We are now installing a sludge control box into which the sludge will flow due to a hydraulic head between the clarifier and the control box. Flow from the control box to the sludge pump will be automatically controlled with a butterfly valve, sensitive to the sludge head inside the box.

Agricultural grade anhydrous ammonia is used as a nutrient for the bacteria and is admitted into the suction side of the sludge pump. This ammonia was originally bought in 150-lb. bottles, using banks of three bottles at a time. We are now using 2000-lb. trailer tanks at a cost of 8½c per pound. Ammonia flow is controlled by a manual valve and measured with an indicating flow meter.

Instrumentation for the plant consists of recording controllers on semichemical and chip board water flow, and flow recorders on effluent water, sludge, air, and black liquor. All recorders for liquid flows have bubble pipes for sensing elements. The air flow is measured by the differential pressure across a sharp-edged orifice.

Cost of the plant

1. Clearing plant site, backfill, and grading	$1,488.94
2. Aeration and clarifier tank, clarifier equipment and control house.	32,542.31
3. Pumps, pipes and valves	21,014.11
4. Air blower and filter	4,301.77
5. Instrumentation	3,867.16
6. Electrical wiring and controls	7,434.29
7. Black liquor storage tank	1,023.75
Total Cost	$71,582.33

First-year operation problems

Seeding of the plant was started in late March, 1954, using primary and secondary settled sludge from the nearby municipal sewage plant, a trickling filter operation.

Sonoco's chip board waters were first fed to the plant on April 5, 1955. It was immediately evident from the sludge being carried over the effluent weir in the clarifier, that additional weir length was needed. Eight half-sections of 8-in. diameter pipe, each 20 ft. long, were installed as overflow weirs for clarified water. This gave 320 lineal feet of overflow weir, and for our maximum flow was well above the minimum recommended standard of 5000 gal. per day per foot of weir length. Also, at this time, an adjustable overflow gate was installed at the partition wall between the aeration section and the clarifier. This was done to keep the high water velocity caused by the circulating air from being carried over into the clarifier and upsetting the settling action. During this period of structural changes, minimum flow and feed requirements for supporting bacterial life were maintained.

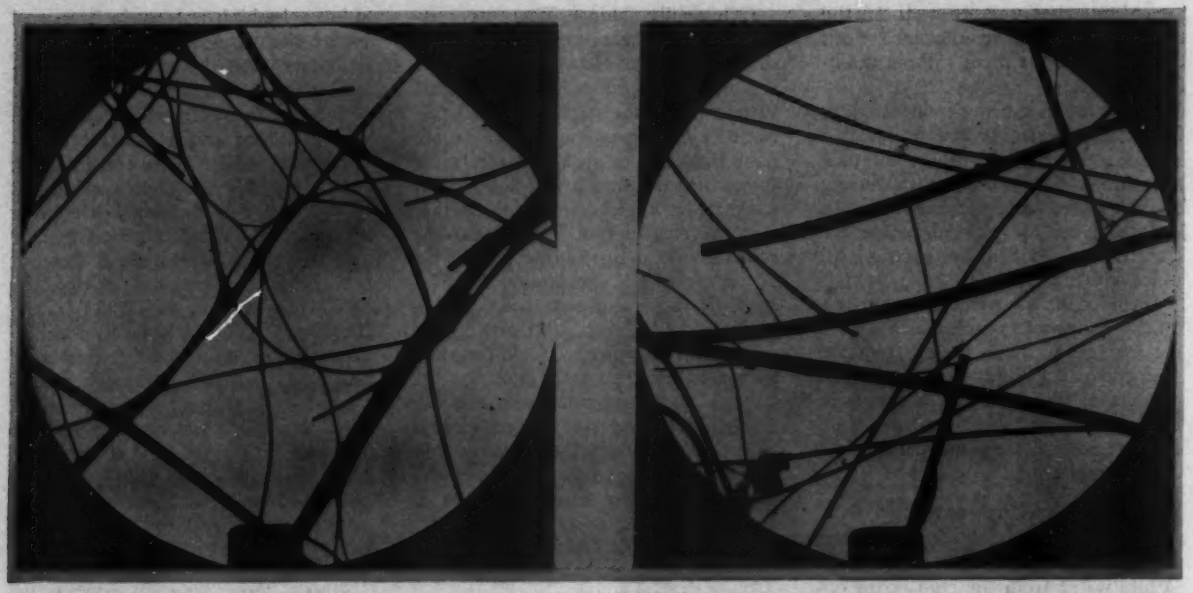
In early May the plant was brought to 700-gpm flow on chip board water having a BOD concentration of 250 ppm. At this time a small flow of semichemical water was started. Its BOD concentration was 2500 ppm. As the flow of semichemical was increased, the sludge became overloaded and would not settle properly. This is termed as "bulking" sludge. At this time, the stream was reaching its critical pollution stage and it was decided to keep a high BOD load into the plant while attempting to correct the trouble, so that the stream would be relieved as much as possible. This period of bulking sludge lasted from mid-May till mid-July, and during this time the additions of clay, agricultural limestone and a bactericide, along with variations of air and influent water to the plant were tried as corrective measures. None worked, and the final solution was simply reducing the BOD load enough to allow the mixed liquor in the aeration tank to become well saturated with dissolved oxygen. During this period average data were as follows:

Waste water flow, gpm	525
Lbs. BOD removed per day	1675
BOD Conc. — influent, ppm	354
BOD Conc. — effluent, ppm	78
BOD Removal — efficiency	78%

The first period of "bulking" sludge was by no means the last. In September a long, stringy fungus growth developed and kept the sludge from settling properly. This growth was visible to the eye and reached lengths of 4-5 ft. The remedy in this case was feeding an excessive amount of ammonia. In November, an excess of paper fiber got into the bio-oxidation system due to holes in the screen on our Waco filter. This was corrected by dropping the BOD load to the plant and allowing the bacteria to digest the fiber. The most difficult case occurred during December and January, when a microscopic filamentous growth developed. This caused such bad sludge conditions that we were considering dumping the plant and reseeding when a cure was found. This cure was subjecting the sludge to alternate periods of aerobic and anaerobic conditions and was done by holding the sludge longer than normal in the clarifier.

Although we had intermittent periods of poor clarification, we did

(Continued on Page 688)



Electron micrograph of the higher-strength glass fiber paper developed by the National Bureau of Standards. The gelatinous binding material, seen at most of the intersections of the fibers, was formed by the addition of sulfuric acid to a pH of 3.4 during the paper-making process

Electron micrograph of glass fibers acidified to a pH of 3.8. Note the absence of adhesion between the fibers. Practically no gelatinous layer is formed on the fibers at pH values greater (i. e., less acid) than 3.5. The project was undertaken for the Naval Research Laboratory

Improved glass-fiber paper

▶ At pH 3.5 a gelatinous binding layer, rich in silica, is formed on the surface of the fibers. Paper made under these conditions has a tensile strength of more than 300 lb/in.

RESEARCH at the National Bureau of Standards has succeeded in producing an all-glass paper eight times as strong as that first made in 1951.* Because of its greater strength, this paper should prove much more convenient for those uses—such as gas masks, chemical filters, and electrical equipment†—where the unique properties of the all-glass paper have already made it particularly valuable.

The higher strength is achieved by control of the acidity and temperature of the glass fiber suspension and by minor changes in the mechanical handling of the fibers in the paper mill. Details of the improved process‡ were worked out in the Bureau's paper laboratory as part of a project sponsored by the Naval Research Laboratory.

Although glass fibers have been widely used for some time in textiles, such as glass curtains and filter cloths, and in plastic laminates, their use in making all-glass papers is relatively new. About three years ago, the Bureau, in cooperation with NRL, produced the first machine-made paper composed entirely of glass fibers without additives or binders. This paper, which resembles soft blotting paper, was found to have a number of important applications. Tests showed it to be many times more effective as an air filter than commercial filters then on the market. In gas mask tests in a smoke-filled room, only one smoke particle in 100,000 passed through the glass-paper filter. Another important advantage of all-glass paper is its high resistance to heat, moisture, chemicals, and micro-organisms. This, in combination with excellent electrical characteristics, makes it valuable as an insulator and dielectric for special applications.

Measurements at the National Bureau of Standards in Washington show the tensile strength of the improved glass fiber paper to be more than 300 lb./in.

Several paper mills are now producing the all-glass paper for military and civilian uses. The product has appeared on the market in mine respirators and gas masks and as filter disks for laboratory crucibles. It is being studied for possible use as a filter of hot or corrosive fluids, as an air filter in air conditioners, as a saturating or laminating base for plastics, and as an electrical insulator in coil windings, condenser and transformer cores and

Experimental demonstration shows graphically the effect of acid and alkali on the dispersion of glass fibers. Each beaker in the circle contains glass fibers in suspension at the indicated pH. The fibers are well dispersed between pH 2 and 4. From pH 2 down to −1, a gel is formed. Above pH 4 the fibers are clumped together, and below −1 in the acid range clumping occurs again. The fibers are in the best condition for papermaking between pH 3 and 4

battery separators. Other possible applications include heat insulation where a thin material is required, sterilizable papers for medicine and surgery, and antitarnish and anticorrosion papers.

However, for all these uses, the low tensile strength of the all-glass paper—originally 30 to 40 lb/in.‡—has been a disadvantage, requiring extra care in production, storage, and handling. The improvements made in the process by NBS increase the tensile strength to more than 300 lb/in. and should thus make the glass-fiber paper considerably more practical for commercial manufacture and use.

Differences in glass fiber processing

Because the properties of glass fibers are so different from those of the cellulose fibers ordinarily used in papermaking, considerable change has been necessary in applying the usual papermaking techniques to the manufacture of glass-fiber paper. For example, in the manufacture of ordinary paper vegetable fibers are processed with water in a "beater", which bruises the fibers and forms minute fibrillae. Mechanical entanglement of these fibrillae aids in bonding the fibers together. In addition, prolonged beating is thought to increase the adsorption of water on the fibers, which enhances fiber-to-fiber bonding when the fibers of the paper are dried in close contact.

With glass fibers, on the other hand, no fibrillation takes place, and no significant hydration ordinarily occurs. Because bruising breaks the fibers and tends to weaken the paper, the beater is adjusted to eliminate most of the pressure on the fibers and is used merely for suspension and circulation of the fibers.

In the glass papermaking process as improved at the Bureau, beating is conducted at a temperature of 85°F, and the pH of the glass-water mixture is adjusted to 3.5 or less by adding sulfuric acid. Under these conditions, the fiber bundles open up and are dispersed more quickly, less fiber breakage occurs, and the resultant paper is stronger.

Mechanical changes have been made in the equipment to eliminate strings or lumps in the finished paper. Because glass fibers in the stock flow system of a paper mill tend to accumulate on any projection or rough place, sharp angles were eliminated from the piping. A horizontal stock chest with agitators moving in a vertical plane was also installed so that the fibers would fall back into the liquid instead of accumulating in strings as they do on horizontal agitators.

When the fiber suspension was brought to a pH of 3.0 as it entered the jordan, it was found possible to pass it through the jordan refiner of the paper mill without damage to the fibers, a step that had hitherto been impossible. Treatment in the jordan also helped to break down strings and knots, resulting in a much improved formation in the finished sheet.

Previously it was necessary to maintain a fairly high moisture content in the all-glass paper in order to carry it onto the reel of the paper mill, for the glass paper has a higher tensile strength when wet than when dry. The additional strength was sufficient to eliminate breakage between the dryers and the reel. However, glass papers made by the Bureau's improved process have enough strength that they can be dried to the same extent as cellulose papers and still be carried onto the real without breaking.

Effect of pH in binding the fibers

Photomicrographs made at the Bureau show the effect of a lower (more acid) pH in binding the fibers together to give higher strength. Ordinarily, acid reacts so slowly with glass as to have negligible effect. However, the very fine glass fibers expose a tremendous surface to the acid, which starts to dissolve the soda and lime in the glass, leaving on its surface a thin gelatinous layer, rich in silica. When the water drains from the fiber suspension on the wire of the paper making machine and the fibers are pressed together, this gelatinous layer acts as an adhesive to bond the fibers together in the paper. The pH value must be below 4 to obtain this effect, and the tensile strength increases as the pH decreases in the range studied (down to 2.9). Ionizable acid is drained off during the formation of the sheet, so that the pH of the finished paper is effectively neutral—from 7.0 to 7.4.

The use of acid also causes rapid dispersal of the fibers in the beater. This may be due in part to an ionic electrical phenomenon resulting from the initiation of the chemical reaction between the acid and the glass. It is known that negative electrical charges appear on the surface of the glass, and the mutual repulsion of the like-charged surfaces is probably responsible for the quick separation of the fibers.

A temperature of 85°F in the beater likewise aids in promoting dispersion of the glass fibers. The decreased viscosity and interfacial tension of the heated water apparently causes it to wet and penetrate the fiber bundles more readily.

References

*See Paper from glass fibers, NBS Technical News Bulletin 35, 177 (Dec. 1951).

†See the electrical properties of glass-fiber paper, by T. D. Gallinan, R. T. Lucas, and R. C. Bowers, Elect. Mfg. 48, 94 (August 1951).

‡For further technical details, see Effects of mechanical preparation and pH on the strength of glass-fiber paper by Martin J. O'Leary, Robert B. Hobbs, J. K. Missimer, and James J. Erving, TAPPI 37, 446 (1954).

View of Crown Zellerbach's new $600,000 Central Research Laboratory which was dedicated by H. L. Zellerbach on September 14, 1955

Crown Zellerbach's new research laboratory

CROWN ZELLERBACH'S new research laboratory at Camas, Wash., provides this corporation with all the modern facilities required by an expanding industry determined to maintain its leading position in an age that is yielding the reins to research, as the motivating center for practically all major industrial operations. The will and determination alone to remain in the vanguard of production no longer suffices. The company must also have the facilities and knowledge, both fundamental and applied, that will guarantee its position of leadership and enable it to produce better, and more economically, than its competitors.

The importance Crown Zellerbach places in its new research laboratory is evident from Harold L. Zellerbach's dedication address in which he stated, "Today we are dedicating far more than this beautiful building and its modern equipment—we are really dedicating the resources of Crown Zellerbach Corp., including a skilled and resourceful research staff, to a better future for all those whose lives are touched by the forest products industries."

The research building's dimensions are roughly 170 by 50 ft., giving it nearly 24,000 sq. ft. floor space on three floors. Administrative offices occupy the east end of the second and third floors, while laboratories occupy the west end of the building and the south side of the first floor, with provisions made for easy extension of the laboratory area when needed. The laboratory section includes special laboratory space for pulp and paper testing, optical measurements, biochemistry, and analytical work. All laboratory benches are equipped with stainless steel tops which greatly increase their serviceability.

The building also features an auditorium which opens off the entrance foyer and has a capacity for seating 200 people.

The superbly equipped companion building, the Development Laboratory, will be used for developing to commercial scale the ideas generated by the personnel working in the research building.

These facilities will enable the company not only to improve its basic product, paper, but also to develop new paper products and chemical by-products.

Long-range objectives

Robert T. Kimberlin, vice president for corporate development, listed the following as the basic long-range objectives of the corporation:

1. To produce diversified products of the highest possible quality for sale at the lowest reasonable price.

2. To maintain the corporation in a strong competitive position.

At the hemlock planting ceremony in connection with the dedication of the new laboratory, left to right, Truman Collins, Portland C-Z director; A. B. Layton, administrative vice president; H. L. Zellerbach, executive vice president (with shovel); D. R. Schmidt, secretary; E. P. Stamm, vice president, N. W. timber operations, and R. T. Kimberlin, vice president corporate development.

3. To obtain full utilization of the company's forest resources.

4. To conduct operations for the benefit of stockholders, employees, and customers in a manner which is not only consonant with the public interest but which also makes a positive contribution to economic and social well-being.

Based on these objectives, as discussed by Mr. Kimberlin, the company has established the policy of maintaining a broad and sustained research program in all fields of corporate endeavor. Thus, part of the program is designed to help increase the productivity of the company's tree farms. Other phases of the program are directed toward the discovery of new processes and products, both fibrous and non-fibrous, and the improvement in quality and uniformity of existing products. A continuously increasing portion of time and energy will also be devoted, without interruption, to fundamental research.

Another objective is to achieve complete and profitable utilization of mill wastes, which can only be brought about through the recovery of a diversified line of bulk and fine chemical products from the organic materials present in these wastes.

Research and product development is another important company objective. Considerable emphasis is now placed on developing new and improved converting and consumer products in which paper is combined with plastics and other similiar materials. Moreover, the company is no longer concerned solely with paper. It has moved into lumber and plywood and is rapidly advancing to integrated operations which will use paper, lumber, and plywood in many novel combinations with resins and other materials.

Short-range projects

Mr. Kimberlin further stated that the company hoped to complete within the next five to ten years the following short-range projects:

1. Development and installation of an efficient and continuous pulping process yielding a product of higher quality and containing more of the fibrous raw materials.

2. Commercial production of new chemical by-products from the pulping process.

3. Large scale use of resin-impregnated papers, represented by the company's CreZon grade in the manufacture of plywood and lumber—along with such other developments as the combination of plastics with paper to produce improved consumer and industrial paper products.

Organization of research

The research laboratory is under the general direction of Dr. W. W. Moyer, with the majority of problems falling into three classifications as follows:

1. Fiber research, which is under the direction of Dr. J. D. Wethern. This includes experimental pulping of woods and other fibrous raw materials, evaluation of wood species as sources of pulp, improvements in currently-used pulping processes, exploration of new pulping processes, fundamental and applied studies on the refining of fibers, new and improved methods for bleaching, and physical and chemical modifications of fibers to confer special properties in papermaking.

2. Paper research, which is under the direction of Dr. J. S. Barton. Paper research deals with problems

Examining some of the products in the laboratory are Dr. J. S. Barton, manager of paper research, Dr. W. W. Moyer, director of research, and Dr. W. R. Holzer, product manager

H. L. Zellerbach (right) congratulates Col. W. B. Greeley, retired chief of U.S. Forest Service, who gave the banquet address to 150 invited guests

connected with improving the qualities of paper products now manufactured by the company and the creation of new paper products. Among the latter is the creation of CreZon, a new plywood and lumber overlay sheet, developed through the combination of papermaking fibers with the newer resins and high polymers. Another specific example is a new industrial wiping tissue which has been rated tops in a market research survey.

3. Process development, which is under the direction of Dr. W. G. Meyer. This includes most of the work on the development of chemical and industrial by-products from the pulping process. ORZAN A, a crude lignin product derived from spent liquor from the ammonia-base sulfite pulping process, was the first product manufactured and sold on a commercial basis. Another development in this program is the construction of a pilot plant in Camas to produce two million lbs. of dimethyl sulfide.

Market development

Crown Zellerbach's market development activities on new chemical products, as described by Dr. Moyer, are handled by the chemical products division under the management of Dr. W. M. Hearon. Dr. Hearon has the responsibility for the introduction and sale of the company's new chemicals. This includes the determination of properties of the new material, making sound guesses of possible uses, advertising the product, distributing samples, and exploring promising leads by personal contact. Any deficiencies which show up in application must be corrected where possible and potential customers often require technical assistance.

This experimental paper machine is an example of the facilities of a superbly equipped development laboratory

Carbohydrate constituents of pulps and pulp sources

—a symposium held at the 128th meeting of the American Chemical Society

DR. LOUIS E. WISE
The Institute of Paper Chemistry

THE AMERICAN CHEMICAL SOCIETY held its 128th national meeting at the University of Minnesota in Minneapolis from September 11 to 16. Hundreds of papers were presented at divisional meetings, which also sponsored dozens of symposia. Thousands of chemists, not only from the United States, but also from many countries of the free world, attended these meetings and joined in the discussions. There were over a dozen plant trips, innumerable breakfasts, luncheons, and social hours. On Monday evening, Prof. Joel H. Hildebrand, noted chemist of the University of California, gave his presidential address on "Intelligence is Important," and Dr. Charles A. Thomas of Monsanto Chemical Co. — the Priestley Medalist — addressed a meeting on "Science as a Profession and its Appeal to Youth," and some of the inadequacies of our present educational system were discussed frankly. Too many college men, it appears, are taking the easy courses instead of those requiring the scientific disciplines.

However, we shall focus not on the many scientists milling around the Minnesota campus, meeting old friends and conferring with colleagues, visiting the local laboratories or later migrating to the beautiful lakes of northern Minnesota, but on a few papers and especially on a single symposium sponsored by the Division of Cellulose Chemistry. This was the symposium on *Carbohydrate Constituents of Pulps and Pulp Sources*, held jointly with the Division of Carbohydrate Chemistry.

The symposium dealt in the main with those components of the pulpwoods known as the hemicelluloses (or polyoses) which are present in nearly all paper pulps and which contribute so greatly to the properties of the paper made from them. In a few papers, related subjects were also discussed. Several decades ago, the hemicelluloses in a wood or pulp were largely ignored. Today we recognize that their presence or absence is often critical. This is probably the first symposium in which the recent advances on the configuration of these polyoses has been dealt with so thoroughly, and with such insight into their fundamental importance.

The selfless efforts put into this successful meeting by the chairmen, Dr. Jerome F. Saeman of the United States Forest Products Laboratory, and Dr. Leo B. Genung of the Eastman Kodak Co., deserve the very highest praise.

Effects of hemicelluloses on pulp properties

Dr. L. E. Wise of the Institute of paper Chemistry spoke on the effects of the hemicelluloses on pulp properties, in which the latter were highlighted. The material here presented was not new but was in the nature of a review of very recent work. It was pointed out that, in the absence of hemicelluloses, pulp hydration was difficult and sheet strength developed slowly. Such a material, while poor paper stock, would probably yield a dissolving pulp. When a great excess of hemicellulose is present in pulp—a glassine stock is at hand. Between these extremes lie an almost limitless series of pulps that can be used for a variety of papers, the amounts of hemicelluloses influencing the strength properties of each. However, in the reviewer's opinion, not only the amounts, but the configuration of sugar units present in the hemicelluloses of such pulps seem of importance in lending certain strength properties to the sheet. Take the case of the hemicelluloses isolated from a softwood like spruce. When these were added as beater additives to an alpha pulp, they lent greater strength to the pulp sheet than did hemicelluloses derived from a hardwood like aspen. The spruce hemicellulose contained appreciable amounts of mannose units (mannans); the aspen hemicelluloses did not. In one set of experiments it was shown that those hemicellulosic beater additives which were highest in mannan gave pulps with the highest tensile strength and burst. These strength properties decreased with gradually decreasing amounts of mannan in the hemicellulose. These experiments carried out at The Institute of Paper Chemistry were orienting rather than conclusive and thus require a deeper study.

This same paper also discussed the differences between kraft, sulfite and neutral sulfite semichemical pulps, a number of which remain unexplained. In coniferous sulfite pulps, the relative ease of hydration (in contradistinction to the more sluggish hydration of kraft) may be correlated with uronic acid groups in sulfite pulp.

Acetylated holocellulose components

Reporting from the College of Forestry (State University of New York), Dr. Mamerto Cruz (now with Olin-Mathieson) described his work and that of Prof. E. C. Jahn. A study was made of the components of paper birch holocellulose and of their acetate derivatives. The object was to determine the effect of hemicelluloses on acetylation, and thus the paper should be of interest to manufacturers of dissolving pulps. The holocellulose was separated into three fractions:

hot water solubles, 5 per cent caustic soda soluble matter, and the insoluble (alpha-cellulose) residue. Each of these fractions was then acetylated and fractionated further. With increasing molecular size, the percentage of uronic acid, arabinose, and galactose units decreased; the xylose units increased. The acetylated alkali-soluble portion showed a regular polymolecularity curve, the percentage of xylose units increasing with increasing molecular weight. By "activating" holocelluloses with 90 per cent aqueous formamide, the degree of polymerization decreased. No such decrease was noted with the alpha-cellulose fraction. Only by removing an appreciable amount of the hemicelluloses during activation could an acceptable acetylation be obtained. This alpha-cellulose residue gave an acetylated product yielding a water clear "dope" and a chloroform color that was nearly water white.

Determination of carboxyl groups

Prof. George Jayme and Karlheinz Neuschäffer of the Institute of Cellulose Chemistry in Darmstadt compared various methods for determining carboxyl groups in various de-ashed pulp samples. No final judgment was reached, and inasmuch as this interesting and stimulating paper has already been published elsewhere (cf. *Das Papier* 9, 143-152, 1955) no attempt will be made to elaborate on it here, other than to say that of all methods studied that of K. Wilson was probably the simplest and best. An accurate and reproducible method for determining the carboxyl content of purified cotton linters and wood pulp was developed in the Celanese Corp. laboratories and reported by H. W. Steinmann and Blanche B. White. The method depends on the interaction of the free carboxyl group with calcium acetate, and titration of the generated acetic acid. The celluloses used were "de-ashed" by electrodialysis in a specially constructed cell. A feature was the equilibration of all distilled water with carbon dioxide. In this way, free acetic acid could be determined without excluding air. Purified wood pulps contained 1.9 to 2.4 milliequivalents of carboxyl per 100 grams.

Fractionation of sulfite pulps

In his fractionation of sulfite pulps, Dr. H. W. Giertz (of the Technical University of Norway at Trondheim) separated them into alpha- beta- and gamma-fractions. Among other techniques he used lithium hydroxide and sulfuric acids as swelling agents. The fractions were all hydrolyzed and analyzed for sugars. Both the alpha- and beta-celluloses contained 96-97 per cent glucan, 2-3 per cent mannan and 1 per cent xylan. The gamma celluloses contained a mixture in which the glucan was relatively low, and mannan and xylan were greatly increased.

In his exposition, Dr. Giertz used a somewhat different terminology than the common use—but this need not be elaborated. His paper proved to be highly controversial—largely because he attempted to define a "pure" wood cellulose only in terms of beta-glycosidically linked glucose chains. Thus mannose and xylose residues are viewed by Giertz as "difficulty removable impurities" trapped in the "cellulose strings." This view was not acceptable to a number of other cellulose chemists. For example Dr. Jayme pointed out that he had subjected the resistant polysaccharides of wood to such extensive hydrolysis that his insoluble residues represented less than 20 per cent of the original material. This residue still contained very small amounts of mannose and xylose units. This tenacious retention in "cellulose" of units other than mannose and xylose was also confirmed by Dr. Saeman, and experiments at Appleton substantiate the work of Professor Jayme at Darmstadt. Dr. Fred Smith of the University of Minnesota spoke (in a private discussion) of the futility of seeking a "pure" cellulose—based simply on an ideal concept. In the reviewer's opinion, cellulose is a *system*, not a pure individual. Some cellulose may contain small amounts of mannose or xylose units—glycosidically linked to the glucose.

Another point which Dr. Giertz made (which remained undisputed) was that beta cellulose was not originally present in the wood, but was an artifact formed by partial degradation of the alpha cellulose. Gamma cellulose was obviously hemicellulosic in nature.

Hemicelluloses in western hemlock

Tuesday afternoon, while Dr. W. W. Moyer (of Crown Zellerbach Corp.) presided, Dr. Hamilton from Rayonier Inc. reported on the nature of hemicelluloses associated with wood cellulose in western hemlock wood. Two distinct types of hemicelluloses were obtained by the alkaline extraction of a hemlock sulfite pulp. On acidification of such an extract, the precipitate was a glucomannan containing 3-4 parts of mannose to 1 part glucose. The dialyzed filtrate, on concentration, yielded a mixture of polysaccharides. As the concentration increased, xylose and 4-0-methyl-D-glucuronic acid units were the main components. Physicochemical studies were made on these two types of hemicelluloses.

The constitution of a hemicellulose isolated from western hemlock was also studied by G. G. S. Dutton and Prof. Fred Smith of the University of Minnesota. In this case the wood was converted into a holocellulose, which was then extracted with potassium hydroxide. The extracted hemiculluloses were purified through a copper complex, the products from which were then methylated and subjected to an intensive study. A polysaccharide (termed "A") was shown to be an araboglucuronoxylan, the constitution of which is discussed. Inasmuch as Western hemlock is an exceedingly important pulpwood, these fundamental studies are of major interest. Dr. Smith's brilliant investigations were presented with his usual modesty and brevity. Interestingly enough, Dr. Hamilton had found neither arabinose nor galactose units in his hemlock sulfite pulps, which has been confirmed repeatedly elsewhere. However, in the holocellulose of hemlock, Dr. Smith found appreciable amounts of these units, and actually isolated a galactomannan.

Disaccharides from alpha pulp

The question as to whether disaccharides (other than those containing only glucose) could be isolated from an alpha pulp of slash pine has been resolved in part by Austin Anthis of The Institute of Paper Chemistry. In Mr. Anthis' absence, Dr. Ward read the paper. Obtained from a chlorite holocellulose by successive extractions with 5 and 24 per cent potassium hydroxide, the resulting alpha-cellulose was acetolyzed, and subsequently deacetylated. Thus Anthis isolated, besides the predominating cellobiose, two sugars each containing two mannose units, an unidentified disaccharide containing two glucose units, and two sugars containing both glucose and mannose. One of these was the 4-0-*β*-*D*-*glucopyranosyl*-*D*-*mannose*. The other was shown to be (an incompletely identified) mannosylglucose. None of these sugars appears to be an artifact, and there is a strong indication that a very resistant portion of the pure wood cell wall (i.e. "cellulose") contains mannose linked to glucose.

Hemicelluloses from loblolly pine, aspen and birch

In studying the hemicelluloses of another import pulpwood, loblolly pine, Prof. J. K. N. Jones and Mr. Painter of Queens' University isolated and studied four polysaccharide

fractions that (1) contained mannose, glucose and a small amount of galactose units, (2) contained xylose and 4-methyl glucuronic acid units, (3) contained arabinose and galactose residues and (4) contained xylose and glucuronic (or galacturonic acid) residues. Professor Jones and Mr. E. Merler also reported on the hydrolysis of aspenwood xylan components after fractionation of the sawdust successively with water and increasing concentrations of potassium hydroxide. These fractions were then treated with the *hemicellulase* (Rohm and Haas, Enzyme 19), and their results were discussed at length. The insoluble fragments remaining after enzyme action were largely xylans. Interestingly enough, the enzyme caused hydrolysis of the acid resistant (4-methyl glucuronosido xylose) (1, 2), which is known to be one of the characteristic groupings in aspen. This latter fragment also occurs in birchwood, as shown by Dr. C. Gustafsson (of Helsinki, Finland). Here for every 15 xylose units there is about 1 methylglucuronic acid residue. Contrasted with softwood xylan containing uronic acids, birchwood did not lose all its uronic acid in the kraft cook. The xylan in sulfite and sulfate pulps from birch in Dr. Gustafsson's opinion did not increase the fiber-to-fiber bonding in a paper sheet to the same extent as did the xylan from corresponding softwood pulps. Dr. Gustafsson also gave some interesting data on "tension wood," which occurs in the upper surfaces of leaning limbs or tree trunks of the hardwoods. Such wood is much higher in cellulose and galactan and much lower in xylan.

Xylan studies

At the Wednesday morning session of the symposium, during which Prof. J. K. N. Jones presided, the first two papers were by Drs. Roy L. Whistler and W. M. Corbett of Purdue University. In the one, the behavior of xylan in hot caustic soda was explored. Apparently this xylan was very stable and formed no acid. A partially hydrolyzed xylan however gave products which suffered further degradation even with lime water at 25° C. leading to the formation of a new (branched) saccharinic acid. Apparently the orginal xylan had contained no reducing group due to initial oxidation in its isolation.

The second paper from Purdue dealt with the oligosaccharide formed from corn-fiber hemicelluloses; the fiber is available in large quantity from the wet milling industry. An interesting trisaccharide was obtained and identified as a galactosyl (1-4)-xylosyl (1-2) arabinose, an unusual natural product. This, and another disaccharide are believed to be side chain constituents of the original corn-fiber hemicellulose.

Fractions from wheat bran and wheat straw hemicelluloses were studied by chemists of the Canadian National Research Council in Ottawa. The straw xylan was investigated by Dr. C. T. Bishop, who caused hydrolysis by the enzyme of a mold—*Myrothecium verrucaria*. His conclusion is the arabinose units in wheat straw are joined by primary valence to molecules of xylan; probably the first time that proof has been so definitely presented.

Saccharinic acids in black liquor

An interesting study of the components in kraft black liquor was reported by Dr. John W. Green of The Institute of Paper Chemistry. The alkaline liquor was shown to contain a series of saccharinic acids, which were isolated with great difficulty—and finally obtained as a mixture of saccharinic anilides. Paper chromatography indicated that saccharinic acids having 3, 4, 5, and 6 carbon atoms were present, and two of the anilides were obtained in crystalline form. One of these was shown to be the anilide of alpha-isosaccharinic acid, and the application of Dr. Green's procedure in studying saccharinic acids during kraft pulping was discussed.

Acid resistance of pentosans

Dr. H. P. Binger, who worked with Prof. A. G. Norman of the University of Michigan, presented an interesting paper on the acid resistance of pentosans in hypochlorite and chlorite wood celluloses. In aspenwood holocellulose, 3 per cent sulfuric acid was capable of removing most of the pentosan fraction. This was not true in the case of a hypochlorite cellulose (isolated by the Norman-Jenkins method), in which the pentosan is extremely resistant. Other woods behaved similarly. Thus it appears that this "resistant pentosan" may be (in part at least) a product of the treatments involved in the isolation of the pulp from the original wood. This paper closed the highly successful symposium, which perhaps, more than any held hitherto, focused attention on the structure and properties of the hemicelluloses —which to a great extent influence the strength properties of the finished sheet of paper. It is the first time that some of these important components have been explored by interested organic chemists in university laboratories.

Separation of hemicelluloses from aspen holocellulose

In the general meetings of the Cellulose Division, several other papers deserve mention. Mr. J. E. Milks and Prof. C. B. Purves of McGill University attempted the preparation of a homogeneous hemicellulose from aspen chlorite holocellulose by treatment with anhydrous ammonia (after pretreatment with hot water). The ammonia removed 10.6 per cent of the wood, giving acetamide, modified lignin and carbohydrate. Following the NH_3 extract, another 9.6 per cent of the residue then became soluble in water. This fraction contained pectin and various hemicelluloses, the separation and study of which were discussed. These units are linked by positions 1-4, with many branches on the 2nd and 3rd carbon atoms of various xylose units.

Lignin studies

Dr. Pearl of The Institute of Paper Chemistry reported on the isolation of various products produced by lignin oxidation. Chromatography was used, and some 24 different compounds were isolated and characterized. Two of these were present in a quantity (exceeded only by vanillin and vanillic acid), but as yet no complete structures have been assigned to them. The determination of the acidic functions of lignin by dimethylformamide was studied and reported by Dr. John Butler of the Institute.

Two interesting papers emanated from the laboratory of Prof. Conrad Schuerch, of the College of Forestry at Syracuse. In one of these with his collaborators Herbert G. Arlt Jr. and K. Sarkanen he characterized an ethanol spruce lignin obtained by treating the wood at 60° C with 0.2 normal hydrogen chloride in a mixture of chloroform and ethanol. Most of the lignin was removed in this way, and its various fragments (including ether soluble oils) were studied. The methoxyl-to-carbon ratio of the colored lignin approached that of the theoretical for a propylguaiacyl polymer. Dr. Schuerch's second paper (with Mr. R. Nelson) discussed the effect of particle size, alkali concentration, and temperature on the caustic soda extraction of pentosans from birchwood. In this work Dr. Schuerch removed about 80 per cent of the xylans and found no support for the concept of a lignin-carbohydrate bond. Needless to say, this furnished no evidence as to whether the remaining (unextracted) xylans in birchwood are (or are not) linked to lignin.

Theoretical aspects of bleaching

JOHN R. PECKHAM*

Dr. G. Jayme presents Mitscherlich Medal to Dr. H. F. Lewis

THE SYMPOSIUM held September 15-17 at The Institute of Paper Chemistry, Appleton, Wis., on the Theoretical Aspects of Bleaching was arranged by the Fundamental Research Committee of TAPPI (Technical Association of the Pulp and Paper Industry) and was sponsored jointly by that committee and the Pulp Purification Committee.

The groundwork for the meeting and the discussions was laid well in advance by the circulation of a questionnaire to 30 mills, in which problems related to the fundamental nature of the bleaching process were solicited. The interest engendered by this approach was reflected in the high percentage of returns and the large number of questions posed by technical men. Even after disposing of duplicate questions, 133 problems were incorporated in the handbook which was distributed to the registered guests.

J. R. Salveson of Marathon Corp., Rothschild, Wis., the symposium chairman, opened the program with a short address in which he described the planning of the symposium.

Harry F. Lewis receives Mitscherlich Medal

Of national and international interest was the presentation of the Mitscherlich Medal to Dr. Harry F. Lewis on Thursday. Dr. George Jayme, representing the "Vereinzellcheming" (German Technical Association corresponding to our TAPPI), made the presentation and extended his congratulations. He read a partial list of offices held by Dr. Lewis and expressed his amazement at the dean's versatility. He pointed out that only a few of these medals had been awarded, and that the award made to Dr. Lewis was the second to go to an Institute staff member — the first having been presented to the late Dr. Emil Heuser.

Current concept of bleaching

Dr. Harry F. Lewis, dean of The Institute of Paper Chemistry, defined bleaching as "the process of brightening the color of unbleached mechanical or chemical pulps." He then described briefly the constituents of wood and pulp and their effect on the pulp color. It seemed reasonable, he said, that extractives were the primary colored materials since isolated cellulose, hemicellulose, and lignin were essentially colorless.

The fading of groundwood was discussed as a case in point, since most of the extractives remain in this material. Bleaching methods, such as hydrosulfite, peroxide, and hypochlorite were mentioned and specific problems such as the coloring matter in western hemlock were touched on. The concept of photo-electric processes being present in fading of groundwood, thus involving lignin and hemicellulose, was offered. The theory that peroxide may react with a specially reactive bond in lignin was also mentioned.

In the field of bleaching chemical pulps, the neutral sulfite semichemical pulp is least changed from the original wood, and Dr. Lewis called attention to some of the problems in bleaching this material which were probably traceable to organic constituents. The paper ended with an appeal for continued research in the field of bleaching and suggested that, because of the shortage of qualified personnel, a close cooperation should be maintained between the several groups studying the problem.

Behavior of chlorlignin

F. Loschbrandt of the Norwegian Pulp and Paper Research Institute discussed the behavior of the chlorlignin from chlorinated sulfate pulp. The effects of changes in temperature, the presence of salts and oxidation on mobility were scrutinized. He concluded that at constant temperature, the mobility of chlorlignin increases and sedimentation velocity decreases with increasing pH. From this it was deduced that changes in molecular size or state of aggregation may be responsible primarily for the pH effect. This change in size of the chlorlignin probably takes place within the pulp fibers also and may account for the efficiency of alkaline extraction of chlorinated pulps.

Mechanism of chlorine reaction

Dr. D. H. Grangaard of Kimberly-Clark Corp. reported on a study he had made on the distribution of the reaction of chlorine in the chlorination stage of pulping. He found that the substitution reaction took place rapidly at first when an excess of chlorine was present, then slowed down, with oxidation taking over. When the permanganate number of the pulp is very low, no substitution is noted, and oxidation accounts for the entire reaction. Experiments with swollen pulps, either mercerized or refined, showed that the total chlorine consumed by both substitution and oxidation was lowered. He also stated that mercerization before chlorination does not aid in delignification, but mercerization after chlorination is effective. In general, his results agreed

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with previous investigation, but improved methods were able to measure greater usage of chlorine in the oxidation reaction than were at first recorded.

Hansjoachim Leugering of the Zellstollfabrik Waldhof in Germany discussed the influence of the chlorine distribution and alkaline extraction on the removal of lignin and the chemical analysis of the bleached pulp, based on numerous systematic bleaching experiments on birch neutral sulfite semichemical pulp of different degrees of cooking. He found that at a relatively low level of pulp brightness it was possible to obtain bleaching without the removal of lignin, but that at the higher brightness levels, dissolution of lignin became necessary.

Some chemical reactions in bleaching

Dr. H. W. Giertz of the Swedish Forest Products Research Laboratory and the Technical University of Norway spoke on "Chemical Reactions Involved in Bleaching with Sodium chlorite and Chlorine Dioxide." He compared the action of these two chemicals with each other and with chlorine and hypoclorite and described the products formed during bleaching. He described some of the reactions between chlorous acid or chlorine dioxide and some carbohydrates, cellulosic materials and certain phenolic substances. He paid special attention to the fundamental differences between the action of chlorite and chlorine dioxide in bleaching.

Oxidation of hemicellulose

Dr. Roy L. Whistler of Purdue University talked on the oxidation of hemicellulose. His work stemmed from an interest in the hypochlorite oxidation of polysaccharides, notably starch. He used model compounds, amylose, and a glucose derivative, and isolated several products which tell the kind of materials formed in the oxidation. In work with corncobs, he has produced and isolated a xylan not degraded under alkaline conditions.

Role of pH in bleaching

Dr. Clifford B. Purves of McGill University showed the need for study of the two bleaching compounds, chlorine dioxide and sodium chlorite. He reviewed the work based on model phenolic compounds at various pH levels. In his study he used periodate lignin and lignosulfonic acid and compared the action of the two bleaching agents at various pH levels. Sodium chlorite was dependent upon a proper pH level in dissolving lignin; chlorine dioxide was not. A complete description of the various soluble and insoluble fractions of the lignosulfonic acid was included in the report.

Dr. W. Howard Rapson of the University of Toronto discussed the role of pH in bleaching and described experiments in which all conditions were kept constant except that the pH was varied by means of suitable buffers over a range extending from 2 to 12. He showed curves comparing the action of several different bleaching agents, such as chlorine, chlorine dioxide, hydrogen peroxide, peracetic acid, and potassium permanganate. The effect of pH change on the brightness, viscosity, and caustic solubility of both sulfite and kraft pulps and the theoretical factors involved were discussed.

Degree of delignification through photomicrographs

Dr. G. Jayme, professor at the Institute of Cellulose Chemistry in Germany, described techniques for making photomicrographs of stained fibers to show the degree of delignification. Dr. Jayme used both electron and optical microscopes and two specific dyes to obtain some remarkable pictures of fibers in various stages of pulping and bleaching. By use of a shadowing technique, he was able to make very clear the presence of the high masses of lignin in areas such as compression wood fibers and around the bordered pits of certain fibers. He demonstrated that fibers difficult to bleach delignify first in the fiber endings.

Dr. Jayme has made a signal contribution to the knowledge of lignin distribution in fibers subjected to various stages of pulping and bleaching and has demonstrated that even in highly bleached pulps with lignin contents of only 0.08 per cent, the lignin retention is chiefly located only in 5 per cent of the fiber.

Color reversion

E. B. Marum of the Solvay Process Div. of Allied Chemical & Dye Corp. discussed color reversion in overbleached pulps. He started with softwood kraft, chemical cotton, bleached alpha pulp, and chlorine dioxide pulps which were then overbleached with chlorine, hypochlorous acid, and sodium hypochlorite. His study of the use of hypochlorite in this manner indicated that the reversion was least when the operation was carried out at a pH of 9.5. Over-bleaching causes little reversion when chlorine dioxide is the bleaching chemical. After studying the effect of caustic extraction on the color reversion of kraft pulps and the effect of additions of hydrogen peroxide and chlorine dioxide, Mr. Marum concluded that kraft pulps treated alternately with chlorine dioxide and sodium hydroxide improved in brightness during storage and could also be brightened instantly by treatment with reducing agents.

Saturday's session led by Dr. Lewis developed the fact that color reversion was of primary interest to the assembly. Specifically, such things as a good test for color reversion was felt to be desirable. Many reasons for color reversion were offered, such as residual lignin, impurities in water, metallic catalysts, metal resinates, etc.

Other questions discussed included the possibility of bleaching without extraction of extraneous material, the effect of temperature on the chlorination stage of chlorine bleaching, the factors which influence the ultimate brightness of bleached pulps, and whether hypochlorite followed by chlorine dioxide was more efficient than when either method was used twice.

Subjects for fundamental research

From the Saturday discussion, a number of subjects for fundamental research were developed:

1. Causes of seasonal variations in pulp quality—bleached and unbleached.
2. Changes in viscosity by chlorination due to seasonal variations.
3. Brightness of lignin.
4. How to remove extractives after chlorination (in the interests of absorbency).
5. Mechanism of fungi degradation of pulp.
6. Nature of the bleach resistant lignin-like residues.
7. Tower reversion.
8. What to do with spent bleach liquors—disposal or re-use.
9. Use of tracer techniques in studying bleaching mechanisms.
10. Study of methods for measuring degradation caused by bleaching (existing and new).
11. The fate of wood resins during bleaching.
12. The relationship between the constitution of hemicellulose derivatives and pulp brightness.
13. Measurement of the amount of true coloring matter in bleached pulps (not by light scattering).
14. Hydrolysis curves at various temperatures and concentrations vs pH for various bleaching agents. (Discussion by Giertz on the existence of such equilibrium data.)
15. Determination of the equilibrium concentrations of the components of bleach liquor systems.
16. As in 15 above, in presence of purified pulp—i.e., consider adsorption.
17. Study of the concentration of bleaching agents on fiber surfaces.

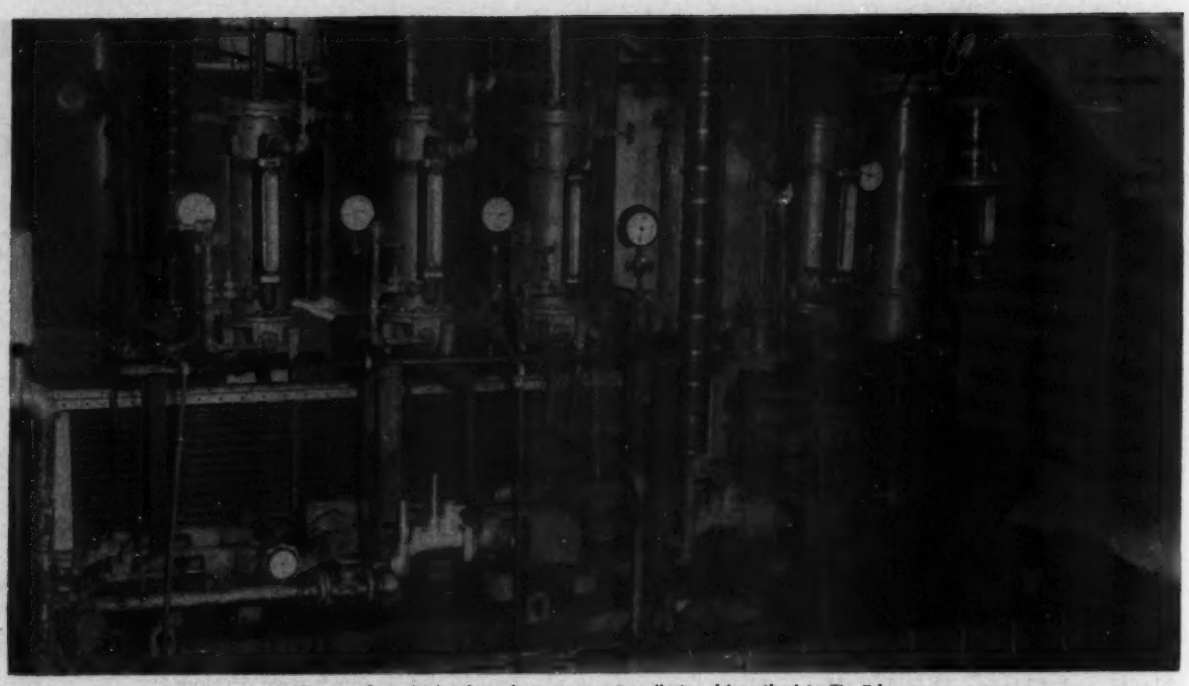

Fig. 1—Six-cylinder formulating pump installation (described in Fig 7.)

Solving low capacity flow control problems in paper pulp bleaching

G. E. SHAFFER Jr. and W. W. DRAKE*

▶ The use of controlled volume pumps in bleaching with chlorine, hypochlorite, peroxide, and chlorine dioxide contributes to efficiency and generally increased productivity

IN THE FOUR MAJOR paper pulp bleaching processes (direct chlorination, hypochlorination, peroxide and chlorine dioxide bleaching) precise control of small quantities of chemical reagents is requisite to economical operations. Regardless of the specific type of bleaching technique used, low capacity flow control problems occur in any or all of the following steps: bleach liquor preparation, blending of bleach and pulp, pH control of pulp during the bleach stages and final neutralization of pulp prior to further processing.

Controlled volume pumps are one of the most common instruments used for solving these low capacity flow control problems. These metering units are reciprocating, positive displacement pumps, designed to accurately meter liquids in measured volumes against a positive pressure differential between pump suction and discharge. They perform this function, in capacities from 3 cc to 1350 gal. per hour, within an accuracy of plus or minus 1 per cent.

Basically, these pumps consist of a drive unit, a plunger, and a specially designed displacement chamber in which the plunger reciprocates. Pump capacity depends upon the diameter of the plunger, the plunger stroking length and the pump speed. Plunger diameter is, of course, fixed for any specific pump. However, these pumps are produced with a variety of controls over the two remaining variables affecting pump capacity.

The choice of control is determined by the nature of the application. Many of the possible control measures are discussed in the following actual controlled volume pump applications. These are divided into four major groups, depending on the type of bleaching used. In each major group the use of controlled volume pumps in bleach preparation, pulp and bleach blending, and pulp neutralization are discussed.

Chlorination

Chlorination, direct reaction of chlorine (in water solution or as vapor) with unbleached pulp, is primarily used to destroy residual lignins after cooking. This operation, combined with hypochlorination, consumes less chlorine than if hypochlorination alone were used. A higher strength, high brightness pulp also results.

After chlorination, the highly acid pulp is neutralized and cleaned in the caustic extraction step (Fig. 2). Here,

*Milton Roy Co.

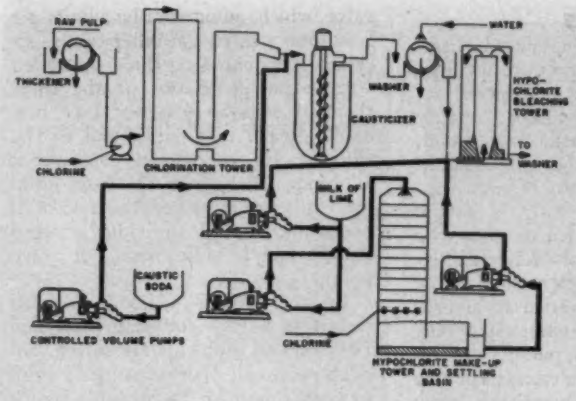

Fig. 2—Chlorination-hypochlorination bleaching system

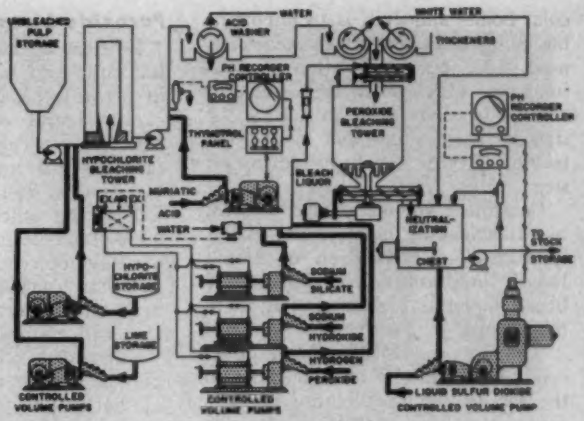

Fig. 3—Hypochlorination-peroxide bleaching system

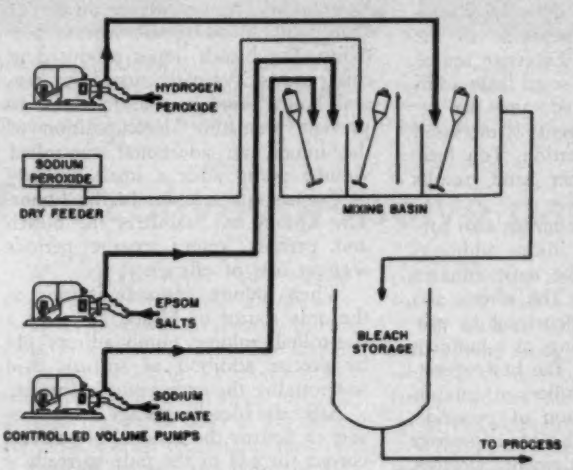

Fig. 4—Mixed peroxide (hydrogen peroxide-sodium peroxide) bleach preparation system

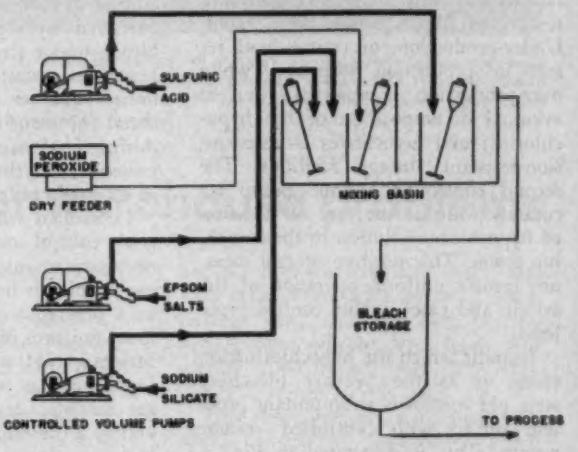

Fig. 5—Sodium peroxide bleach preparation system

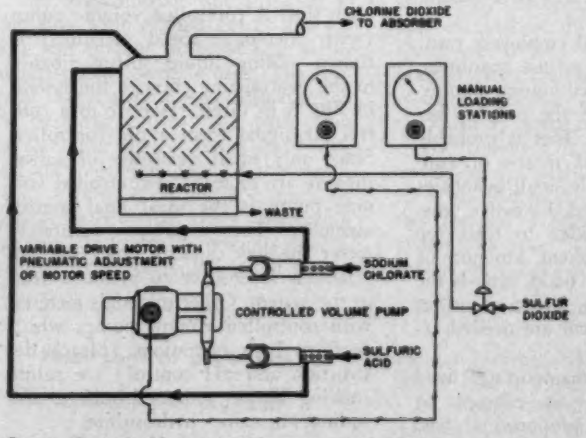

Fig. 6—Typical chlorine dioxide preparation system

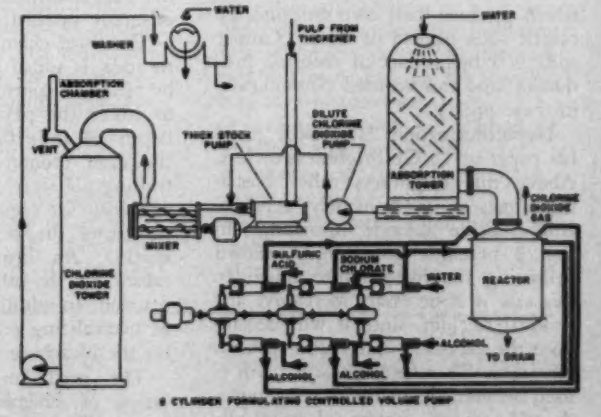

Fig. 7—Typical chlorine dioxide bleaching system

a controlled volume pump varies the rate of caustic addition through a continuous dilution system. This system makes it possible to control pulp consistency and also control treatment level. The controlled volume pump capacity is adjusted in proportion to pulp rate to deliver a controlled quantity of concentrated caustic into the water line. This dilutes the caustic to process concentration. A consistency regulator controls the water (dilute caustic) flow rate. This system provides close control of process conditions and results in a more uniform product. Dilute caustic to the washers is similarly controlled.

Hypochlorination

Hypochlorination, the reaction of hypochlorites with pulp to destroy

color bodies and dyes, is an important bleaching technique. It is sometimes used alone but more often in conjunction with other processes to achieve specific results. In Fig. 2 straight chlorination and caustic extraction precede the hypochlorination step.

Controlled volume pumps perform two functions in these systems, namely, controlled preparation of bleach liquor, and controlled addition of bleach liquor and pH control agent to the process.

The first controlled volume pump continuously meters milk of lime to the top of the hypochlorite preparation tower. This addition is carefully controlled according to the pulp flow rate so that only a nominal operating reserve of bleach liquor is prepared. Under-production, of course, will result in production stoppage, while over-production is wasteful (due to eventual decomposition of the hypochlorite) and necessitates large corrosion-resistant storage facilities. The second controlled volume pump accurately controls the rate of addition of hypochlorite solution to the bleaching tower. This positive control measure insures uniform operation of the system and eases quality control problems.

In mills which use hypochlorination alone or as the primary bleaching step, pH control is an important problem solved with controlled volume pumps. This is illustrated in Fig. 3, where two controlled volume pumps add milk of lime and hypochlorite bleach liquor to the pulp. Many mills which produce their own chlorine use caustic soda instead of lime. (Caustic soda is a by-product of chlorine production and can be used economically in these mills).

Hypochlorination is usually used for paper of 75 GE brightness or less. Above this brightness other bleach techniques are used, namely, peroxide and chloride dioxide bleaching. In Fig. 3 peroxide bleaching is shown following the hypochlorite stage. In this case it is necessary to remove any residual calcium, since it will decompose the peroxide and reduce process efficiency. Therefore, an acid wash is used between the two bleaching stages. A pH control system electronically varies the capacity of the controlled volume pump through Thymotrol speed regulation to meter either hydrochloric acid or a mixture of hydrochloric and sulfuric acids to the pump. This treatment removes the calcium with the washings, which are sent to waste. Close control is necessary since, at low pH, pulp breaks down and alkali consumption increases in the next bleaching stage.

Peroxide bleaching

Efficient operation (reduced chemical costs and high product quality) in peroxide bleaching necessitates accurate control of the low capacity chemical flows involved. In addition, ratio control must be provided to maintain the basic ratios of one chemical to the other. Finally, a simple means must be provided to adjust the quantity of chemical delivered by each flow control element so that the basic ratios may be varied in accordance with changes in treatment levels.

Controlled volume pumps are important flow control elements for five of the six principal chemical reagents used in preparaing peroxide bleach liquor. These flow control instruments accurately control the delivery of concentrated hydrogen peroxide to the bleach liquor stream. Excessive use of peroxide is wasteful since little additional value is derived, and the demand for reducing agents is increased during final neutralization. Too little peroxide, on the other hand, results in off-grade pulp.

Controlled volume pumps also precisely control sodium silicate additions necessary to insure the most efficient use of bleach liquor. The silicate acts as a detergent and penetrant to promote uniform bleaching; as a buffer it maintains pH within the best operating range; as a stabilizer it inhibits the catalytic destruction of peroxide; and as a corrosion inhibitor it protects metallic process equipment surfaces. Excessive use of silicate is wasteful. Too little will promote one or more of the undesirable effects with resulting off-grade product.

The third chemical employed, caustic soda, is added in precise quantities, by means of controlled volume pumps, to adjust the pH of the pulp to between 10 and 10.3. This is probably the most economical means of controlling pH since only small quantities of caustic are required. Excessive caustic causes the peroxide to react too quickly. An insufficient amount of caustic, on the other hand, retards the reaction. In addition, larger quantities of neutralizing reagent are needed after the bleaching step.

The need for maintaining fixed ratios of chemicals is effected by means of a simple proportional feed system illustrated in Fig. 3. In this system, the total flow rate of bleach liquor is adjusted by a rotometer and valve combination. A positive displacement meter in the water line measures this flow rate and linearly converts it into an air or electrical signal. This signal (a series of impulses in direct proportion to flow rate) actuates a master four-way air valve which automatically admits air from one side to the other of the air cylinders mounted on three controlled volume pumps. Ratios of the three chemical streams (50 per cent peroxide, 50 per cent caustic and 41° Bé silicate) are maintained constant at all times. Changes in the basic ratios are easily made, while the system is operating, through individual manual stroke length adjustment of each pump.

In the mixed peroxide process shown in Fig. 4 the same flow and ratio control problems are solved. Sodium peroxide (dry) is used with hydrogen peroxide to furnish a bleach liquor of the desired alkalinity. These processes are semi-continuous since it is necessary to provide a means of thoroughly blending the sodium peroxide. The bleach liquor produced in this process is usually stored for several hours prior to use. In order to prevent premature decomposition of the liquor, an additional controlled volume pump adds a small quantity of Epsom salt solution to the liquor. The Epsom salt stabilizes the bleach and permits longer storage periods without loss of efficiency.

When sodium peroxide is used as the only source of bleach (Fig. 5) a controlled volume pump adjusts pH by precise addition of sulfuric acid to neutralize the excess caustic formed.

After the bleaching stage it is necessary to destroy the residual bleach and correct the pH of the pulp to ready it for further processing. Usually small quantities of reagent added to the pulp at the neutralizing chest accomplish this. A controlled volume pump (with pneumatic speed variation) is shown adding liquid sulfur dioxide to the neutralizing chest in the system in Fig. 3 in direct response to a control air signal from a pH controller. Since only small quantities of sulfur dioxide are required, a controlled volume pump is the ideal final control element. These pumps accurately meter the low capacity flows and are relatively insensitive to pressure drop in the system. Other materials metered with controlled volume pumps which perform both operations (bleach destruction and pH control) are sulfite cooking liquor, sodium bisulfiite, and sodium or zinc hydrosulfite.

Chlorine dioxide bleaching

Controlled volume pumps accurately control the preparation of chlorine dioxide. In the process, chlorine dioxide is produced continuously as required. Many systems have been developed to liberate the active chlorine dioxide from sodium chlorate. A typical system (Fig. 6) utilizes a du-

(Continued on page 651)

Conveyor installation at C. W. Mills Paper Co. greatly eases the materials handling operation. At the left, loaded overhead tow trucks are on their way from the motor truck receiving area to storage. At the right, the conveyor enters the shipping area, where trucks are disengaged at a point approximately where the truck in the center of the photo is parked. They are then manually pushed to the shipping dock (to the right in the picture) after being checked and inspected

Tow-conveyors solve paper warehouse problems

C. W. MILLS Paper Co., Grand Rapids, Mich., wholesale distributors of paper products, receives approximately 100 carloads of coarse paper per year, plus 10 to 12 motor truck loads per day. This includes rolls of paper, sheets, paper bags of all sizes, dixie cups, etc. A continuous flow of motor trucks delivers and picks up the merchandise throughout an 8-hour day, five days per week.

The tow-conveyor was installed to eliminate hand-pushed trucks and reduce the amount of labor which this company had formerly used. The conveyor makes a complete circuit through the building, following a path from the receiving door of the railroad cars, past the receiving door of the motor truck delivery dock and continues on through 6-ft. wide aisles, delivering the merchandise to the various departments. Each truck is designated with a code indicating the department where the specific load is to go.

The bills of lading are attached to each truck, along with a "receiver" which is checked off. Both the bill of lading and the "receiver" finally wind up at the shipping department.

When orders are made up, trucks are loaded throughout the storage area. They are then manually hooked onto the conveyor with each load being specifically marked and then inspected and checked at the shipping department where they are manually unhooked from the conveyor and hand-pushed onto the shipping dock for shipment by motor truck.

The conveyor is 546 ft. long and travels at a variable speed of 30 to 90 fpm. The most practical speed for this company's operation is approximately 60 fpm. The "E" pins are spaced on 12-ft. centers. The trucks are of steel construction with solid steel deck, 30-in. wide by 48-in. long, having 6-in. diameter ball bearing hard rubber wheels. The loads will average 1000 lb. per truck. The empty trucks weigh 145 lb. each.

This tow-conveyor is installed in a wood constructed warehouse, which actually consists of three separate buildings, and although the trucks run over a very uneven wood floor, the operation is satisfactory.

Mills Paper considers the following results to be the most important advantages gained through the installation of the tow-conveyor:

1. A uniform, systematic method of handling, storing, and shipping.
2. Reduction of labor formerly required for hand trucking.
3. Damage to products and errors are practically eliminated.
4. More efficient handling.

Flow control problems

(Continued from page 650)

plex controlled volume pump to accurately proportion sodium chlorate and sulfuric acid to the reaction tower in a fixed ratio with sulfur dioxide flow. These materials react, and the heat continuously drives the chlorine dioxide off to be absorbed in water solution which is then added directly to the bleaching tower. If pulp requirements change, the pump capacity is adjustable through a pneumatic manual loading station to insure the correct bleach dosage.

In another system (Fig. 7) a six-cylinder gang pump (illustrated in Fig. 1) delivers sodium chlorate, sulfuric acid, water and methyl alcohol to the reaction tower. The ratio of each stream is independently adjustable (by manual stroke length adjustment while the system is operating) to insure the most efficient operating conditions. The over-all capacity of the system is adjusted according to bleach demand by automatic pump speed control. This makes it possible to simultaneously change the capacity of all six pumps without disturbing their ratios.

As in the other bleaching systems, a controlled volume pump adds caustic soda to control pH in the alkaline range during the initial bleaching stage. After the initial bleach, another controlled volume pump acidifies the pulp in order to accelerate the reaction and to insure the most efficient use of reagents. Sometimes a hypochlorite bleaching stage is used to finish the operation, and, in this case, the acidification is eliminated.

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Those planning new mills or the rejuvenation of old ones should investigate this new type pressure screen at once.

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NEWS of the INDUSTRY

INCOMING RIVER WATER must be chemically treated at Parchment filter plant (l); solids settle in tank at right, while clear water spills over dike. Outgoing water is inspected by Lynn Spath (r); it is much cleaner than when taken from the river

A Paper Mill Helps Clean Up a River: the KVP Pollution Story

EACH DAY SOME 22,000,000 gal. of water course through the Parchment, Mich. mills of the KVP Co. The Kalamazoo River is the lifeblood of the plants.

Recognizing, however, that paper manufacturers are not alone in their dependence on water, KVP inaugurated several years ago a comprehensive stream improvement program. Primary goal of the continuing project is the reduction of the amount of waste discharged by the firm into the river. In a recent survey of this program, KVP declared: "Other industries, cities and towns, sportsmen and farmers have need for water. Each also has an obligation to use this natural resource in such a way that it will not cause serious stream pollution, thereby limiting its use by others."

There are some 13 mills located on the Kalamazoo, all of which discharge waste into the river. This heavy concentration of the paper industry, together with the relatively low flow of the river itself, has caused the pollution problem to assume grave proportions in recent years.

Twenty-five years ago KVP was one of the first industries in the area to do something about stream improvement. At that time, it dug the first settling pond for its waste water. Since then, it has added several more ponds, has purchased expensive equipment to filter out waste in the mill itself, and has established a continuing laboratory control program in an effort to purify its water before it is returned to the river.

How well has the program worked? A recent regulation by the Michigan Water Resources Commission allows

UNITS IN BATTLE against stream pollution include the Sveen-Pederson (l), which filters water at a rate of 1200 gpm; at work on the recently installed equipment are Frank Kimble and Hamon Hazell. At the right is the Waco filter in Mill No. 1; it is operated by Dick Wiers

THREE IMPROVED washers at the Parchment plant of KVP filter water, save fiber from river. Here, Ken Rodgers controls flow

WATER FLOWS through large basins located at the rear of Mill No. 2. Solids settle to the bottom as water returns to the river

WATER is filtered in special equipment (l) so that it can be weighed (r) to determine the percentage of waste contained in the mill's white water

KVP to discharge into the stream 10 lb. of solid waste material for every ton of paper production. In recent months, the firm has been able to reduce its waste discharge to well below that figure.

In a recent issue of *KVP Log*, the company's employee publication, KVP noted that it does not feel it has found all the answers to stream pollution as yet. "Stream improvement is largely a process of trial and error," the publication declared, "conducted over a period of years. It involves extensive studies, a search for solutions, the purchase and installation of complicated and expensive machinery. Often another machine must be added when the first proves inadequate. Above all, stream improvement depends upon close cooperation between mill departments and employees in seeing that not a single particle of unnecessary waste finds its way to the river."

Savealls Form Backbone

During a recent week-end Parchment maintenance men were busy on a special project aimed at further clean-up of the river. They were connecting the No. 2 Mill's paper machines with a new saveall, manufactured by Sveen-Pedersen Sales Corp.

Latest addition to the expensive battery of machines installed by the

CHART at river weir, being changed by Bill Fredericks of Parchment lab, records flow of water to the river

SAMPLES of mill water flowing from the Parchment settling basins into the river are taken three times daily

firm to combat stream pollution, the saveall does just what its name implies—it saves wood fibers and other paper ingredients from being lost to the river in the papermaking process.

Other savealls of varying types at Parchment accomplish the same thing. Mill No. 1 has a Waco filter and an Improved washer, while Mill No. 2 has a pair of Improved washers in addition to the Sveen-Pedersen unit. (The Waco filter and Improved washers are manufactured by Improved Machinery Inc.)

In general, fresh water is introduced at the paper machine wires, and the excess paper machine water is clarified as it leaves the paper machine by either the Waco filter or the flotation or sedimentation savealls. Any excess clarified paper machine water beyond the requirements for beater furnish or for bleach plant operation is discharged as effluent. Any and all effluent from the bleach plant is discharged from Improved vacuum washers.

Although most waste in KVP's white water is filtered by equipment before leaving the mill, some waste water—particularly that containing unrecoverable lime, chemicals and dyes—is treated differently. It must be channeled into a bank of settling basins.

To make doubly sure that the water finally discharged into the river from these basins is as pure as the stream improvement program can make it, a rigid system of laboratory checks has been established. Three times daily a chemist from the Parchment research lab takes samples of the water as it enters the river, later analyzes them to determine the percentage of waste. The results are then posted on special bulletin boards adjacent to the paper machines for everyone to see.

Thor Corp. Buys Allied Paper Mills

Thor Corp., manufacturer of washing machines and other home appliances, plans to purchase Allied Paper Mills of Kalamazoo, Mich. According to Arnold Maremont, Thor board chairman, the offer has been accepted by Allied directors.

Thor will acquire all Allied assets except its cash, government securities, certificates of deposit and the cash surrender value of its life insurance. No purchase price was disclosed.

Allied, a producer of book and coated paper blanks and other specialty papers, will be operated as a division of Thor.

WATER CRAWLS up wall of mill building at Tileston & Hollingsworth. The river was about 6 ft. above normal

MILL YARD at Bird & Son in East Walpole as water reached the level of the shipping dock at No. 2 box shop

New England Mills Count Losses in Aftermath of Tragic Floods

PAPER MILLS in southern New England were severely battered during the August floods. For the most part, however, they have resumed normal operations.

Repair crews were marshalled almost before Hurricane Diane had swirled out to sea and were at work in the mills while water still stood knee-deep in many machine rooms. No accurate estimate of damage to the paper industry has been made. But, it is certain that the total cost from the floods will be in the millions of dollars.

Hardest hit were mills in Massa-

chusetts, with plants in Connecticut also badly damaged by rampaging waters. So severe was the damage to the former Pearl City Div. of American Tissue Mills Inc. in South Hadley, Mass., that it is doubtful that the mill will resume operations. (Until recently the plant has been operating as South Hadley Paper Mills Inc.) Water caused the collapse of one wall and completely flooded the machine and beater rooms.

In reports to THE PAPER INDUSTRY, officials of paper mills in the region have been generally optimistic. Typical was this statement by R. L. Marcalus, vice president of Marcalus Mfg. Co. Inc.: " . . . We wish to advise that we consider ourselves quite fortunate with respect to our South Hadley, Mass. mill."

Other reports from flood-ravaged mills in the area:

Strathmore Paper Co.

In a bulletin to customers, Nelson Bridgham, president of Strathmore Paper, declared that in West Springfield, Mass., his firm suffered damages amounting to more than $100,000. The basement of the mills was flooded. No. 1 machine was relatively undamaged, while Nos. 2 and 3 required cleaning. The air dryer that had been recently rewired required extensive repair following the flood.

Some finishing equipment suffered minor damage and was back in operation in a week's time. Cables from the hydro-electric plant were thoroughly soaked. And some problems were encountered with process water because of washouts and breaks in the pipelines serving springs in the vicinity.

While Woronoco Mill No. 1 did not suffer in respect to paper machines, temporary arrangements had to be made for process water and power. At No. 2 mill, the steam plant and pump house were badly flooded and required considerable cleaning. The Woronoco hydro-electric plant was severely hit, necessitating extensive cleaning and repair.

Full operations were resumed at Strathmore mills in late August.

Marcalus Mfg. Co. Inc.

In Mr. Marcalus' letter to THE PAPER INDUSTRY, mill damage was described as follows: "The flood waters completely filled our basement, where were located stock chests, stock pumps and other auxiliary equipment. The water necessitated pulling out quite a number of motors that had to be either baked out or rewound before we could get into operation again. In addition, the water caused some erosion of our building footing, which we are in the process of repairing at this time (September 19). We were very fortunate that the flood waters did not get near our paper machines nor did they cause any inventory loss of either raw material or finished goods.

"Our mill was down from the Friday morning that the water rose until the following Wednesday night."

THE OFFICIAL START of Powell River Co. Ltd.'s $20,000,000 expansion program—centered around the installation of the firm's ninth paper machine—was signalled recently at a simple ground-breaking ceremony. Harold S. Foley (l), board chairman, and Boss Machine Tender F. Courtney Powell, the firm's longest service employee, turned the first shovelfuls of earth on the future site of the 260-in. Dominion Engineering machine. Designed for speeds of up to 2500 fpm, No. 9 is expected to go into operation in the fall of 1956. Looking on in the background are (l to r) J. A. D. Keay of Northern Construction Co., project manager; D. H. R. Blake, Powell River resident engineer; R. Bryce, union official, and J. G. D'Aoust, Powell River senior project engineer

Tileston & Hollingsworth Co.

Reporting on the flood damage to Tileston & Hollingsworth of Boston, Amor Hollingsworth Jr., president, declared: "The river rose high enough to shut us down on the morning of August 20, and on the 21st the stream came over a dike off the end of our dam. At its highest, the river was about 6 ft. above normal.

"Outside the break in the dike, there was no great amount of physical damage to the plant. However, it took so long for the water to go down that two of the machines did not start until September 3, and the third machine finally started on September 9. All electrical equipment that needed to be dried out was ready to run by the time the water had subsided sufficiently.

"The hole in the dike at the end of the dam was filled with granite, and we have been running 100 per cent since September 9. As to the cost of the flood we do not as yet have anything definite. However, we expect it to cost upwards of $100,000."

Bird & Son inc.

Bird & Son's Massachusetts plants on the Neponset River counted their losses at $1,000,000 following the "Big Rain" of August 19. Less hard hit than many New England industries, the 150-year-old firm's chief damage occurred at the East Walpole paper mill, where two paper machines were submerged, and at the inundated floor covering plant down river a mile or so at Norwood.

A section of the paper mill was put under water when flood torrents were released to save the mill dam. By noon on August 19, the mill office and Nos. 2 and 3 paper machines were under 5 ft. of water. The machine shop and basement of the shoe carton factory were also flooded.

The water did not entirely recede until August 21. Clean-up operations began at once. There was considerable damage to motors and other electrical equipment. On August 22 the mill was back in operation—with the exception of the two flooded machine rooms.

One of the flooded machines was back in operation by August 26, the other a day later. Repairs to offices were completed on September 12. It was not necessary to shut down operations in either box shop for lack of paper.

Westfield River Paper Co. Inc.

Loss of inventory and stock, wetting of motors and loss of operating time cost Westfield River Paper at Russell, Mass., approximately $50,000. The mill at East Lee was not damaged, but considerable flooding was reported at the plant in West Conshohocken, Pa.

Southworth Co.

Flood damage at Southworth in West Springfield was confined principally to the back of the mill and to the tailrace. Loss of power forced the plant to shut down for a few days. No damage to equipment was reported, since threatened machinery had been moved to higher ground by fast-working employees.

Stevens Paper Mills Inc.

The two Westfield, Mass. plants of Stevens Paper Mills were badly hit by flood waters. The present estimate of the loss has been placed at $1,000,000.

(Turn to Page 659)

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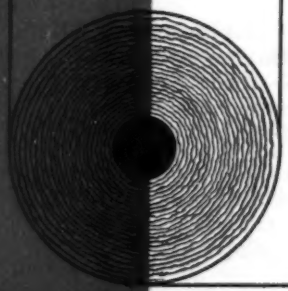
a new BISMARCK BROWN

...created to meet the persistent demand for brighter shades in the basic brown range.

B CONC NEW is chemically similar to our older Bismarck Brown types – BP CONC and the redder RRNP CONC — and offers the same, well-known, good working properties. All three types are non-dusting powders.

Supporting every product we offer are the facilities – available to you – of our Technical Service Laboratories. This service is based on years of intensive laboratory research and years of practical mill experience. We offer full cooperation on all your paper coloring and paper matching problems; we invite your inquiry.

Write us for samples and technical literature; call upon our skilled technical service.



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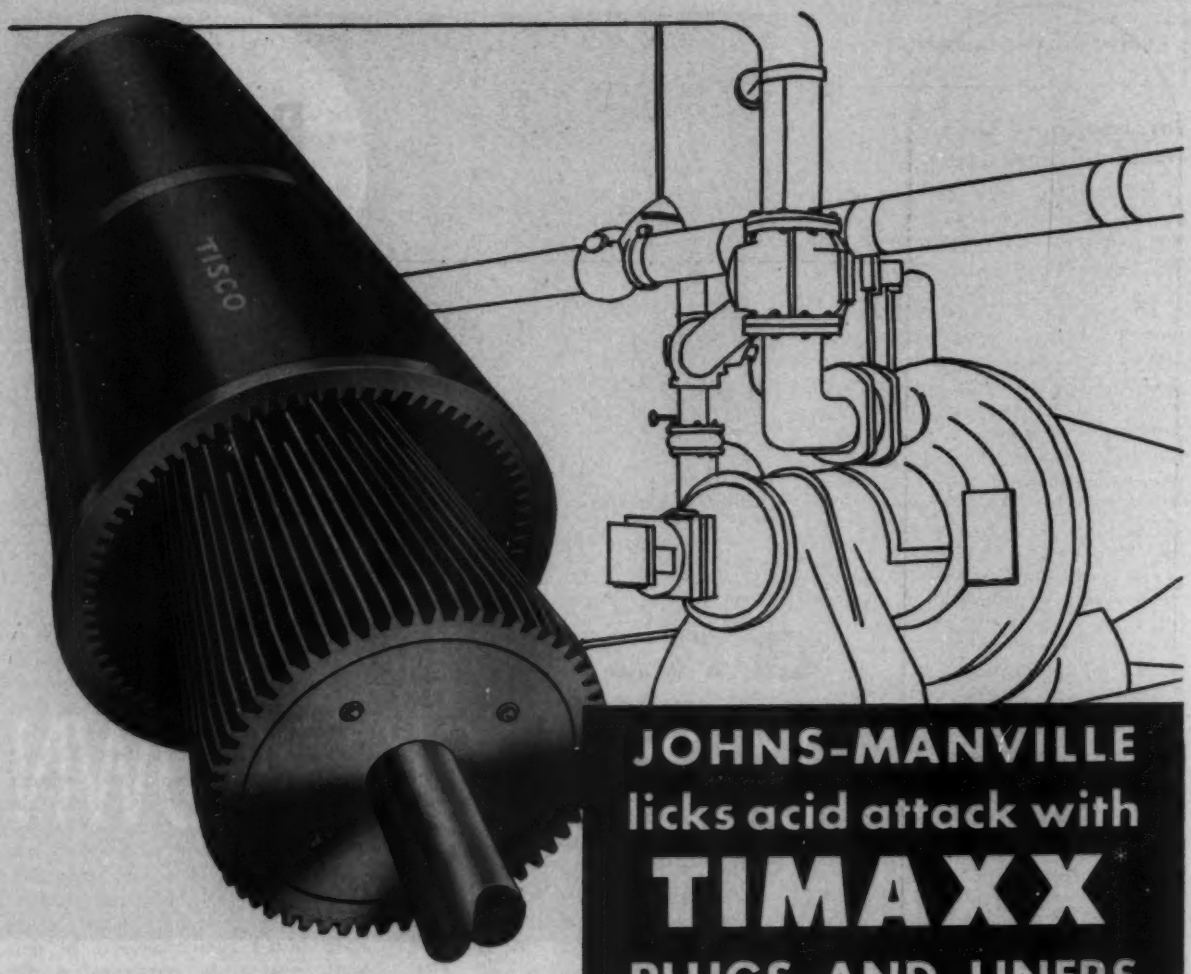

JOHNS-MANVILLE
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for its Jordan Engines

In converting from an open system to a closed system, Johns-Manville faced a severe corrosion problem. Wear and tear was greatly accelerated by the new, highly acidic operating conditions. As a result, the life of their Jordan parts was reduced from an average of six months to only eight weeks.

Then Johns-Manville, conferring with Taylor-Wharton, decided on **TIMAXX** as the alloy most likely to solve the problem. **TIMAXX** Plugs and Liners, installed in January, 1954, lasted a full nine months — about 350% increase in life—giving excellent service throughout. Continuing usage has justified the selection.

A Taylor-Wharton Sales Engineer will gladly help you to determine whether any of our many products for the Pulp, Paper and Roofing industries will reduce your operating costs.

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International OKs Mobile Expansion

The board of directors of International Paper Co. has authorized further additions and improvements to the firm's Mobile, Ala. mill to provide for a new paper machine.

The new 282-in. Beloit Iron Works unit will have an annual capacity of 100,000 tons of unbleached kraft paper. A substantial part of this tonnage will consist of grades presently being produced at Mobile, which will be transferred to the new machine. Present machine capacity made available by this transfer will be used to increase the mill's production of bleached kraft paper grades.

The project is in addition to the mill's current expansion program providing for the installation of a newsprint machine of 100,000-ton annual capacity and related pulp mill, power and other facilities. According to John H. Hinman, International board chairman, when the present expansion program is completed, the Mobile mill will be the largest in the world manufacturing paper.

Both the new machines are scheduled to begin operations during the summer of 1956.

Construction costs and equipment for the new unbleached paper machine will add $18,000,000 to the $20,000,000 authorized earlier this year for the company's construction program at Mobile.

Green Bay Box to Build $1 1/2 Million Plant

Green Ray Box Co. will build a completely modern factory and office building at a cost of $1,500,000. It will be located near the plant of Green Bay Paper & Pulp Co., an associate firm.

The steel-and-masonry building, which will be erected on a 10-acre site, will have manufacturing and office space of approximately 127,000 sq. ft. It will house a new 85-in. Langston corrugating machine with provisions for a second corrugator to be added later. The Langston machine will be 325 ft. long.

The plant will also house a modern and completely equipped testing laboratory, quality control facilities, and greatly expanded research and development departments. It will also feature additional machines for converting corrugated board into shipping containers.

MASTER CONTROL panel for the $1,200,000 stock preparation system recently installed by New York & Pennsylvania Co. at Johnsonburg

New York & Pennsylvania Installs Stock Preparation System at Johnsonburg

A new $1,200,000 stock preparation system has been put into operation at the Johnsonburg, Pa. mill of New York & Pennsylvania Co.

In addition to providing the mill with increased capacity for handling stock, the new system will assure a minimum of variation in consistency, freeness and amounts of soda, sulfite and deinked stock. Officials of the firm point out that this permits highly consistent paper machine operation and ultimately the achievement of better quality.

Constructed on practically the same design as a system that has proven successful at the company's Lock Haven, Pa. plant, the Johnsonburg equipment incorporates the latest ideas in fiber treatment and employs the most modern equipment available.

Prepared stock is received, transmitted, adjusted, stored, blended and delivered to the individual paper machines under precise control. In addition, dry and wet broke and reclaimed waste from all sources are collected. Reclaimed stocks are defibered in a hydrapulper and delivered to the stock system for reuse.

Sulfite stock is received at 4½ per cent consistency from the sulfite mill and stored. It is drawn from this supply, refined at 4½ per cent, then dropped to 3½ per cent and held there. The refining of the soda stock, which is done separately, compares with this. The deinked stock is refined at a separate plant and is also held at precisely 3½ per cent and stored.

In operation, the flow of sulfite to each paper machine is regulated by a liquid level controller in the machine chests. The deinked stock and soda flows are then automatically regulated to the proportioning boxes, their flow being dependent on the sulfite flow.

Colors in a dissolved form are also added at the proportioning boxes. Prepared stock is then pumped to the machine jordan for final refining before being discharged into the machine chests. New Webb filler and clay-starch discharge into each machine chest at the jordan discharges.

With the completion of the new broke system, the consistency of the refined broke will be controlled, and the broke stock will be added at the machine jordan discharge box by a Ratosleeve flow control system. Stock flow and liquid level are controlled by 50 instruments located on a large control panel.

Other Features at Johnsonburg

Among other features of the NY&P installation are nine Stebbins Engineering & Mfg. Co. storage chests. Of glazed tile, each has a capacity of 42,000 gal. (representing 16,000 lb. of fiber in the 4½ per cent storage chests and 12,400 lb. in the 3½ per cent storage chests). An Improved Machinery Inc. neoprene-covered agitator is installed in each stock chest.

Dual stock pumps (Warren Steam Pump Co. Inc.) are installed at all points in the system where an outage would affect the production of more than one machine. All pumps are equipped with DeZurik Shower Co. valves operated by Hanna air cylinders and Valvair solenoid valves actuated by the pump motor starters. These act as check valves to prevent reverse flow.

Control and instrument air is sup-

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MANUFACTURED BY VALLEY IRON WORKS CO., APPLETON, WISCONSIN

plied by two Ingersoll-Rand compressors, each with a capacity of 304 cfm at 100 psi. One compressor supplies air for the entire system. The instrument air is dried by a Lectro dryer before going to the control panel.

A new sulfite mill storage tank of Stebbins glazed tile construction receives bleached, cleaned, controlled stock from a DeZurik regulator after passing over a stainless steel Impco washer at the end of a new Bauer Bros. Co. cleaner installation.

The refiners are E. D. Jones & Sons Co. standard size jordans with special stainless steel fittings. There are six of these driven by 300-hp synchronous motors, the motors and starters being furnished by Electric Machinery Mfg. Co.

The installation also includes a Fischer & Porter Co. stock regulating system, Taylor Instrument Companies liquid level transmitters on each stock chest, DeZurik consistency control equipment, and a complete telephone intercommunication system with all departments. The piping system is completely stainless steel, Type 316 ELC.

CONTAINER COMPRESSION tester at the new Gair lab in Philadelphia is demonstrated by John P. Greiveldinger, Gair's general container production manager. Looking on is E. S. Petze, materials control coordinator for Scott Paper Co.

Gair Centralizes Container Testing at Philadelphia

Robert Gair Co. Inc. has established a quality control laboratory at its Pennsylvania Corrugated Box Div. in Philadelphia. The lab will serve all 16 of the firm's shipping container plants.

David E. Anderson, formerly with Seaboard Container Corp., has joined Gair as manager of the laboratory. He reports to Arnold W. Hoffman, who is in charge of container quality control.

The laboratory is completely air conditioned to provide a controlled climate. Relative humidity is maintained at 50 per cent and temperature at 73°, within close tolerances. For the pre-conditioning of containers and board samples for testing, one section is maintained at a relative humidity of from 25 to 30 per cent.

Equipment includes a National Forge container compression tester, Elmendorf tear tester, Mullen tester, Beach puncture tester, flat-crush tester with accessories for making pin adhesion and ring stiffness tests, an electric oven and waterproof testing tank.

Two Firms Push Alberta Mill Construction

St. Regis Paper Co., in partnership with North Canadian Oils Ltd., is speeding construction of a bleached sulfate pulp mill and power plant at Hinton, Alberta. The pulp mill will have a capacity of approximately 175,000 tons a year.

Scheduled for completion in 1957 at a cost of $33,500,000, the mill will be powered by natural gas that will be piped 136 miles through a 10-in. pipeline, capable of handling 70,000,000 cu. ft. per day.

Chicago Firm Buys H&D Iowa Mill for Conversion

Crandon Enterprises Inc. of Chicago has purchased the idle Hinde & Dauch Paper Co. mill in Fort Madison, Iowa, with plans to convert it into a wood pulp paper mill.

A Crandon spokesman said that from $700,000 to $1,000,000 will be spent in remodeling the 33-year-old mill. Paperboard made here will be sent elsewhere for processing into corrugated boxes. (Hinde & Dauch, a subsidiary of West Virginia Pulp & Paper Co., closed the mill June 30. It had been making paper from straw.)

Great Northern Installs Chemi-Groundwood Digesters at Maine Mill

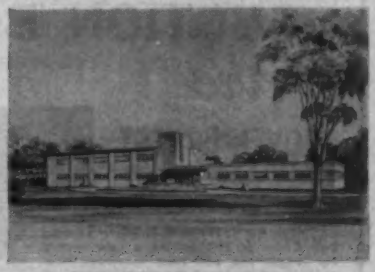
Two vertical chemi-groundwood digesters have been installed in the second phase of a $45,000,000 expansion program at the East Millinocket, Maine mill of Great Northern Paper Co. The units were fabricated and erected by Bethlehem Steel Co.

The plant expansion, which centers around two new paper machines producing newsprint at a maximum speed of 2500 fpm, will increase capacity to 900 tons daily.

LOGS COOKED to proper softness tumbling from digester at East Millinocket mill of Great Northern Paper Co.

The digesters, more than 10 ft. in diameter and 64 ft. high, are the first vertical ones in the paper industry. Debarked hardwood logs are cooked for 8 hours at temperatures of 265° to 310°F.

Made of thick carbon steel plates and forgings, each digester weighs 187 tons. These two bring to four the number of such units now operating at East Millinocket.



ARTIST'S SKETCH of Rayonier's new research laboratory in New Jersey, which is now under construction

Rayonier to Build N. J. Research Center

Rayonier Inc. will establish a research center on an 82-acre site in Whippany, N. J. According to Dr. Arthur N. Parrett, vice president in charge of research and development, the move is a further expansion of the firm's scope of research.

(The chemical cellulose manufacturer now has its research facilities concentrated at Shelton, Wash., where 150 scientists and technicians are employed in the Olympic Research Div.

The New Jersey expansion will be known as the Eastern Research Div.)

Work has begun on the initial unit of the new research division, a 32,000-sq. ft. laboratory. Planning has been such that these facilities may be augmented as needed in the future.

Nuclear Scanning Device Installed by Hudson P & P

The installation of a nuclear scanning device at Hudson Pulp & Paper Corp.'s Palatka, Fla. mill has been announced by R. S. Hatch, vice president for research and development. The scanner will continuously observe and regulate the quality of every foot of kraft paper produced.

"The nuclear device," according to Mr. Hatch, "is the largest ever installed in a kraft paper mill and will insure the production of paper with a uniformity of basis weight never before possible. . . ."

Sweeping back and forth across the paper machine, the AccuRay scanner's beta rays measure the precise basis weight of the paper, while an electronic integrator automatically regulates and controls the flow of pulp fed to the machine. It is expected that the unit will regulate basis weight to a variance of less than 2 per cent, as compared to the commercially acceptable 5 per cent.

Abitibi Plans Hardboard Mill in Michigan

Abitibi Power & Paper Co. Ltd. of Toronto is negotiating for the purchase of an industrial site at Alpena, Mich., on which the company plans to build a hardboard mill at a cost in excess of $10,000,000.

Construction of the mill may start by the spring of next year, and the labor force is expected to ultimately reach some 400, with an annual payroll of about $2,000,000.

In the manufacture of hardboard, Abitibi will use native Michigan woods, including substantial quantities of scrub oak.

According to Abitibi, the prime reason for building the mill is the growing demand in the United States for Abitibi hardboard. Since the board was developed some five years ago in the firm's research laboratories at Sault Ste. Marie, Ont., production has been confined to the former newsprint mill at Sturgeon Falls. That mill is now working at full capacity and is unable to satisfy the combined United States and Canadian demand. Production limitations have forced the firm to restrict distribution in the U. S.

Mead Directors Approve Purchase of Chillicothe

The board of directors of Mead Corp. has approved an agreement for the purchase of Chillicothe Paper Co. of Chillicothe, Ohio. The transaction is subject to the approval of the shareholders of both firms.

The basis for the exchange is approximately 215,000 shares of Mead common, equivalent to a ratio of 1½ Mead shares for each common share of Chillicothe.

According to Mead, the combination of resources of the two firms will provide the opportunity to expand capacity for high quality products and will further complement the widely diversified production of Mead. Chillicothe will be operated as a subsidiary under its present management and policies.

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PROVEN by TEST

PROVEN BY TEST, this RES-LIN Suction Box Cover is establishing a new record for longer life and even wearing. It is engineered to meet the requirements of specific production problems of each particular paper machine.

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Write for Further Information and Sample of Material

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Scott Winslow Mill Expansion Well Advanced

A milestone in Scott Paper Co.'s expansion and improvement program at Winslow, Maine, was reached recently when Miss Maine of 1955 christened a freight car containing ScotTowels. It was the first time in the history of the firm that a Scott brand product had been manufactured in New England.

The ceremony took place at the Hollingsworth & Whitney Div., where expansion and improvement programs totaling some $14,000,000 are currently being carried out.

Modernization work at Winslow is aimed at doubling the sales volume within the next five years. The pulp and paper mill became a part of the Scott organization less than a year ago through Scott's merger with Hollingsworth & Whitney Co.

A building is under construction to house a new high-speed paper machine and a wide range of auxiliary equipment. Machine installation is expected to be completed in time for a January start-up.

The plant currently boasts six paper machines and extensive pulpmaking facilities. Production is con-

tinuing on business paper supplies and other paper products for which H&W was noted before the Scott merger. In addition, the plant is now turning out base stock for the manufacture of Cut-Rite wax paper in Scott finishing plants at Oconto Falls, Wis., and Hoboken, N. J.

The combined cost of construction, new equipment and improvements in present equipment and facilities undertaken by Scott will total approximately $6,000,000. In addition, work is being completed on an $8,000,000 project that was begun by H&W prior to the merger. The latter expenditure includes a large power plant installation and new equipment to increase pulp capacity and quality.

C-Z and Gaylord Merge

The boards of directors of Crown Zellerbach Corp. and of Gaylord Container Corp. have adopted an agreement of merger of the two firms.

The agreement provides for the merger of Gaylord into CZ following the approval of the stockholders of both companies at special meetings November 22. Gaylord's 2,695,519 shares of common stock would then be converted into a like number of shares of Crown Zellerbach common after November 30, the contemplated effective date of the merger.

J. D. Zellerbach, president of the San Francisco firm, emphasized that the merger would enable Crown Zellerbach to serve the national market more effectively. "Gaylord would provide us with the necessary means of distributing our diversified product lines throughout most of the United States," he said. "This will increase national competition and benefit consumers by providing wider choices of more quality paper products. . . . At present, each company largely produces different products and sells in separate markets. Our principal productive facilities are on the Pacific Coast, and Gaylord's are in the South, Midwest and East." (Gaylord's headquarters are in St. Louis.)

CZ to Build Bag Plant

Crown Zellerbach has announced plans for the construction of a $2,000,000 multiwall bag plant as a companion unit for its projected kraft paper mill at Antioch, Cal.

Construction is scheduled to begin in December and to be completed by mid-1956. The paper mill will be ready for operation at about the same

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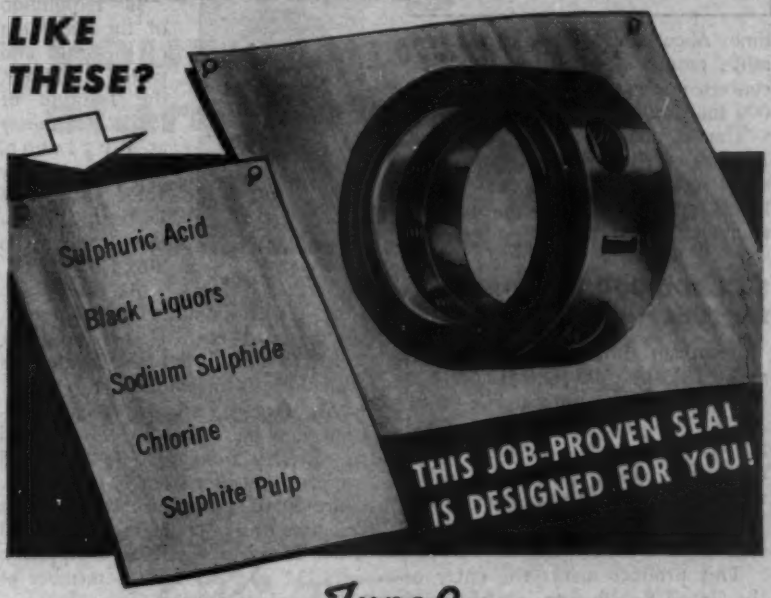
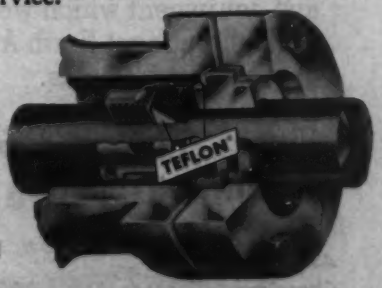


JOHN CRANE Type 9 MECHANICAL SEAL

Performance records plainly prove that this "John Crane" development has successfully solved the handling of the most difficult corrosive liquids and gases. Where conventional type seals had failed, the Type 9 has done the job. It continues to answer new problems, including temperature conditions from —120°F. up to 500°F. . . . pressures to 150 psi. (to 750 psi. in balanced construction).

Designed to withstand practically all chemicals, the Type 9 incorporates a flexible wedge ring and sealing ring molded from DuPont's Teflon. It is engineered for the particular application and can be furnished in the metallurgical specification best suited to the service.

Use the Type 9 on all rotating shaft applications: centrifugal, rotary pumps, mixers, agitators, digester circulating pumps, other equipment.



Can be supplied in double seal construction where required.

Get complete information on the Type 9 Seal from Crane Packing Co., 1802 Belle Plaine Ave., Chicago 13, Ill.

In Canada: *Crane Packing Co., Ltd., 617 Parkdale Ave., N., Hamilton, Ont.*

*DuPont trademark

JOHN CRANE CRANE PACKING COMPANY

time. About 10 per cent of the new mill's output of kraft paper will be converted annually into some 54,000,000 multiwall bags.

The bag plant, covering more than 170,000 sq. ft., will contain two high-speed color printing presses, three tubers and bottomers and auxiliary equipment.

$12,000,000 Expansion for American Box Board

American Box Board Co. will spend $11,000,000 to $12,000,000 on additions to its mill at Filer City, Mich. New facilities contemplated are a third paper machine, pulp mill and bleach plant and other supporting facilities for the manufacture of 125 to 150 daily tons of bleached kraft food board.

This product marks the entry of the Grand Rapids firm into the food board field, "which is the most rapidly growing segment of the paper industry." Construction of the new facilities will require two years to complete.

Institute Enlarges Board; Strange Named President

J. G. Strange

In recognition of the expansion of the pulp and paper industry, the Institute of Paper Chemistry at Appleton, Wis., recently voted to enlarge its board of trustees from 16 to 20.

At the same time it was announced that John G. Strange had been elected president and treasurer. Westbrook Steele was named president emeritus.

Mr. Strange, who has been associated with the school 23 years, served as secretary from 1936 to 1944 and secretary-treasurer from 1944 to 1950. Since 1950, he has been vice president and treasurer. Mr. Strange graduated from Lawrence College in Appleton in 1932 and has been a member of the board of trustees since 1940.

Mr. Steele, while executive secretary of Lawrence College, shared in the founding of the Institute in 1929. In the last 26 years he has served in turn as its executive secretary, executive director and president. In the period during which he has been associated with the school, its staff has grown from three to more than 250, and its annual operating budget has increased from $40,000 to more than $1,500,000.

New members elected to the board of trustees are Alexander Calder Jr., executive vice president and general manager of Union Bag & Paper Corp.; Thomas B. McCabe, president of Scott Paper Co., and Howard Morgan, vice president of Weyerhaeuser Timber Co.

At its meeting, the board of trustees also named Harry F. Lewis, dean of the Institute, as vice president in charge of academic affairs. C. B. Sitterson was re-elected secretary and Doris Pickert, assistant secretary.

Keyes Fibre to Double Size of Indiana Plant

Keyes Fibre Co. of Waterville, Maine, will begin construction late this year of a major addition to its plant at Hammond, Ind. The project will double the plant's space and potential tonnage capacity. (Keyes is the nation's largest maker of molded wood pulp products.)

Constructed in 1947 and now employing about 250 persons, the Hammond plant produces much of the firm's molded pulp packaging materials used by the egg and fruit industries and for the protection of various fragile articles such as fluorescent tubes.

Keyes will install sufficient equipment initially to utilize about 50 per cent of the new space when the addition is ready for operation next summer.

Wisconsin Approves Mead Reservoir After Lengthy Battle by Paper Firms

Construction of a $6,000,000 reservoir by Wisconsin Valley Improvement Co. on the Little Eau Pleine River in three central Wisconsin counties has been approved by the state's public service commission.

The project, which is supported by 11 power and paper companies, was vigorously opposed by various conservation organizations, who urged that the state purchase the area for a recreation-hunting-fishing preserve. In its order, the PSC emphasized that most of the reservoir area had been bought and held by Consolidated Water Power & Paper Co. for the project.

An earthen dam 2.75 miles long is to be constructed to impound waters

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Lundberg-Ahlen Equipment Ltd., 146 E. Broadway, Vancouver

covering 27,500 acres. To be known as the George W. Mead Reservoir, the flowage will be 18 miles long and have a maximum width of seven miles. It is to have a storage capacity of 350,000 acre-feet The water will be released periodically to augment low flow in the Wisconsin River.

The PSC noted that release of 350,000 acre-feet of stored water in the Mead Reservoir will help generate 72,000,000 additional kilowatt hours of electric power downstream in plants of Consolidated Water Power & Paper, Nekoosa-Edwards Paper Co., Wisconsin River Power Co. and Wisconsin Power & Light Co.

U. of Wisconsin Sponsors Pulp and Paper Lectures

The Extension Div. of the University of Wisconsin is sponsoring a series of lectures on "Recent Advances in Pulp and Paper Chemistry and Technology." To be given once each month during the current semester at the Extension Center in Wausau, the lectures will feature experts in various aspects of the general subject.

Scheduled for September 27 was Elwin E. Harris of the U. S. Forest Products Laboratory at Madison, who was to speak on "Recent Developments in Lignin Chemistry." Others in the series will be: October 25—Robert Solari, "Trends in Bleaching;" November 22—Giorgio Ceragiolo, "Sodium Sulfite Pulping;" December 27—Wayne Moore, "Chromatographic Methods of Analysis of Purified Pulps," and January 24—John D. Ferry, "Elastic Properties of High Polymers."

Solari, Ceragioli and Moore are on the staff of the Forest Products Laboratory, while Dr. Ferry is a member of the Department of Chemistry at the University of Wisconsin.

Cellucotton Merger With K-C Approved

Shareholders of Kimberly-Clark Corp. have approved the proposed integration of that company with International Cellucotton Products Co. of Chicago.

Under the plan, K-C will acquire the assets of International Cellucotton through an exchange of common stock on a share-for-share basis. The move has already been approved by IC's shareholders.

The exchange of stock will require the issuance of 2,408,784 additional shares of Kimberly-Clark common stock to International Cellucotton.

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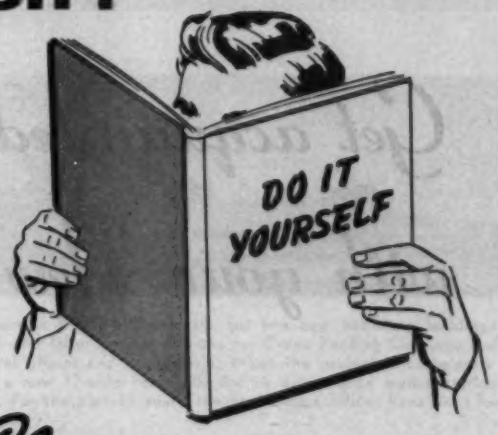

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Use them for sizing . . . 3011 and 3021 convert uniformly to give you the desired penetration . . . increased strength . . . better printing surface. Since they convert well at high solids levels they give efficient coating . . . from application to drying. And, you can count on Clinton enzyme conversion starches for economy, too.

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ALLIED NEWS

GROUND HAS BEEN broken in Morton Grove, Ill., for two new one-story buildings that will house extensive research and laboratory operations for Crane Packing Co.; also included will be executive and general offices and a cafeteria. When the project is completed early next year, Crane will have a new 17-acre home site for its nation-wide manufacturing and industrial service operations. For the past 35 years, the firm's home offices have been located on Chicago's north side

Dorr-Oliver Organizes Pulp and Paper Technical Div.

Dorr-Oliver Inc. reports the organization of a new Pulp and Paper Technical Div. This division, according to the firm, has been established to handle more effectively the world-wide development, design and engineering of all Dorr-Oliver equipment and processes available to the pulp and paper industry —with the exception of those applicable to recausticizing and water waste treatment.

Established to meet increased activity in the field, the new division will supply technical assistance to the sales department and will be responsible for the design, engineering and mechanical improvement of presently existing equipment units including deckers, savealls, board and sheet formers, Ahlfors screens, and the new Webwelder.

Ward H. Pitkin, long active in pulp and paper, has been named director of the division. He was formerly assistant general sales manager.

Lockport Expands "Air Corps"

Two new Beech executive-type airplanes have been placed in service by Lockport Felt Co. of Newfane, N. Y. The firm's use of privately-owned planes began in 1931, when a five-passenger Lockheed Vega was acquired.

Lockport's air fleet now includes a new Remmert Werner "Custom Conversion" Beech D185 and a smaller Beechcraft Bonanza. Availability of this type of quick travel service has proven especially valuable to ferry service and technical service calls and for expeditious transportation of personnel to and from Lockport's new felt mill at Starkville, Miss.

Syntron, Link-Belt Merger

Link-Belt Co. has announced that its directors and those of Syntron Co. of Homer City, Pa. have approved a plan whereby Syntron stockholders may exchange their shares for shares of Link-Belt.

If the plan becomes effective, Syntron will be operated as a subsidiary of L-B, with no change in management or location of operations.

Solvay to Build Georgia Chlorine-Caustic Soda Plant

The Solvay Process Div. of Allied Chemical & Dye Corp. will shortly begin construction of a mercury cell chlorine-caustic soda plant on a 700-acre site near Brunswick, Ga.

Initially, the plant will have a daily capacity of 100 tons of chlorine and 125 tons of caustic soda. Electric power requirements are to be provided by Georgia Power Co.

Allied News Briefs . . .

Research-Cottrell Inc. of Bound Brook, N. J., has announced the appointment of Sheldons Engineering Ltd. of Galt, Ont., as sales representative in Canada. Sheldons Engineering maintains branch offices in Toronto, Hamilton, London, Ottawa and Montreal.

Excel Electric Service Co. of Chicago has purchased rights to manufacture and distribute material level electronic control equipment formerly produced by Gaydon Co. of LaGrange, Ill. This will be the second instrument line to be produced by Excel's subsidiary manufacturing division, Ferr Mfg. Co., present producer of the Allen ground detector.

Allis-Chalmers Appointments

New appointments in the sales organization of the Industries Group of Allis-Chalmers Mfg. Co. have been announced as follows:

V. L. Spinney, manager of the New York district since 1949, has been named manager of the central region to succeed R. L. Halsted, who was recently made manager of the firm's processing machinery department. Mr. Spinney will headquarter in Cleveland.

N. W. Landis has been named manager of the New York district succeeding Mr. Spinney. He has been Detroit manager since 1950. Succeeding Mr. Landis at Detroit is A. J. Mestier Jr., for the last five years manager at Syracuse.

R. M. Leighton

Dr. W. Stubblebine

Stowe-Woodward Appointments

Stowe-Woodward Inc. of Newton, Mass., recently announced the promotion of Ralph M. Leighton, chief chemist, to the post of technical service manager. In another company appointment, Dr. Warren Stubblebine was named director of research and development.

On the S-W staff 24 years, Mr. Leighton's new position will put him in a position to spend considerable time in the field consulting with users of rubber covered rolls. He will function as a connecting link between manufacturing, sales, research and development.

At one time associated with Armstrong Cork Co., Dr. Stubblebine will concentrate his department's efforts on the rapidly expanding use of rubber and covered rolls in the modern technology of papermaking and textile finishing.

Bolton Names Three

Three personnel changes at John W. Bolton & Sons Inc. of Lawrence, Mass., have been reported by Bruno E. Prevost, vice president in charge of manufacturing.

Wallace L. Bolton, former production

Allied News . . .

W. L. Bolton

C. E. Fisk

manager of the Emerson Div. and a grandson of the company's founder, has been made divisional manager of Emerson. Arthur F. Sherman, former supervisor of methods and standards, has been promoted to the position of Bolton plant manager. And Charles E. Fisk, formerly project engineer for the Hyatt Bearings Div. of General Motors Corp., has been named chief industrial engineer.

Allied Personalities . . .

Harold E. Mongovan Jr. has been named sales representative for the Organic Chemicals Div. of North American Cyanamid Ltd. He will represent the division's dyestuff department in Ontario and western Canada. He was formerly with American Cyanamid Co.

H. E. Mongovan Jr

C. A. Hampel

Clifford A. Hampel has joined Fansteel Metallurgical Corp. of North Chicago, Ill., as manager of the chemical equipment division. Formerly a consulting chemical engineer, he will be responsible for engineering, design and sales of products to the chemical process industries.

J. K. Coppens

F. W. Kopplow Jr.

H. Waterbury & Sons Co. of Oriskany, N. Y., has expanded its Midwest sales staff. **John K. Coppens** will represent the firm in Wisconsin, Illinois and Minnesota. **Frederick W. Kopplow Jr.**, who has been with the firm several months, will cover Ohio, Indiana and Michigan. Mr. Kopplow was at one time with Sutherland Paper Co. of Kalamazoo.

Walter A. Salmonson, West Coast manufacturers representative, has announced the association of **Donald R. Tourangeau** to assist in handling DeZurik Shower Co. equipment. Mr. Tourangeau has been a sales engineer with DeZurik since 1952 and was formerly with W. C. Hamilton & Sons Co. and Wausau Paper Mills Co.

R. E. Rogers, formerly manager of the Los Angeles branch of the Foxboro Co., has been made manager of the instrument company's West Coast sales.

W. A. Marquardt has been named assistant manager of D. J. Murray Mfg. Co. of Wausau, Wis. Secretary of the firm and a member of the board of directors, he will assist A. W. Plier, president and general manager, in management affairs.

Lowes E. DeWeese has been named sales engineer for the newly formed paper mill machinery division of Patton Mfg. Co. Inc. A vice president and director of the Kohler System Co., he was until his present appointment a sales engi-

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neer for the Dilts Machine Works Div. of the Black-Clawson Co. (Dilts manufactures and sells the Kohler products.)

Ralph N. Thompson has been named manager of research for Calgon Inc. and Hall Laboratories Inc., chemical subsidiaries of Hagan Corp. A member of the Calgon technical sales staff since 1948, he has specialized in the application of the firm's products and equipment in the pulp and paper industry.

Paul J. Pernice, for the past year a technical salesman and chemist, has been named to head the Portland, Ore. office of General Dyestuff Co. and Antara Chemicals, sales divisions of General Aniline & Film Corp. He joined the firm in 1948.

L. L. Fitzpatrick has joined the recently organized Black-Clawson (Canada) Ltd. as a sales engineer. He was formerly associated with Alexander Fleck Ltd. of Ottawa. Until recently the latter firm manufactured and sold B-C equipment in Canada.

Thomas G. Batchelor has been named to the newly created position of managing director of Hercules Powder Co. (Canada) Ltd. at Montreal. He was formerly director of sales for Hercules' Paper Makers Chemical Department. At the same time, it was announced that **Raymond H. Bishop** had been made sales manager of the Canadian subsidiary.

George E. Bowdoin, former president of U. S. Hoffman Machinery Corp., has joined Worthington Corp. as assistant to the president.

Harry M. Pier, former general sales manager of Research-Cottrell Inc., has been appointed special assistant to the chairman of the board to conduct new studies in the field of atmospheric pollution. Succeeding Mr. Pier is **Charles E. Beaver,** former assistant sales manager.

Raymond J. Lee, president and treasurer, has been elected chairman of the board of Lockport Felt Co. to succeed his father, the late William H. Lee. One new director was elected, **Albert W. Sterritt** of Lockport, N. Y.

Albert C. Cramer has been named assistant to the president of Albany Felt Co., retaining the title of secretary, which he has held since 1949. Mr. Cramer joined the firm in 1920 and was made credit manager in 1943.

A. C. Cramer

F. B. K. Green

Frank B. K. Green has joined the staff of the Pulp & Paper Mill Div. of Sprout, Waldron & Co. Inc. of Muncy, Pa. At one time associated with Anglo-Newfoundland Development Co. of Grand Falls, Nfld., Mr. Green was most recently associated with the Black-Clawson Co. as chief engineer for the Pandia Div.

Two executive appointments have been announced by S. Morgan Smith Co. of York, Pa.: **Oscar E. Weber,** former director of purchases, has been made production coordinator; **Otto H. Koerner,** formerly a sales engineer in the Turbine Sales Div., has been named director of purchasing.

James E. Butler, former manager of eastern sales, has been made field sales manager of the Industrial Div. of the Atkins Saw Div., Borg-Warner Corp.

LeRoy J. Bauer, with long experience in papermaking, is the recently appointed sales engineer for Bauer Bros. Co. in New England. Mr. Bauer, who in no way is related to the principals of the firm, will represent the company's line of pulp and paper equipment.

Dr. Wyly M. Billing and **John R. L. Johnson Jr.,** members of the board of directors of Hercules Powder Co., have been elected vice presidents of the firm. Dr. Billing has been general manager of the Synthetics Department since 1943, and Mr. Johnson has been director of the Legal Department since 1949.

M. J. Lester, district manager for Garlock Packing Co. in Denver, has retired after a 30-year association with the firm. He had been manager at the Colorado office 30 years.

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NAMES *in the* NEWS

T. H. Davis Appointed Secretary of APPA Group

Theodore H. Davis has been named secretary of the American Paper & Pulp Association's community relations committee. Mr. Davis, who succeeds the late Donald M. Rochester, will also serve as secretary of the AP PA's press information committee.

In his new position, he will work with individual firms and with national and regional community relations committees in their efforts to improve the industry's "good neighbor" relationships.

Formerly with American Forest Products Industries Inc., Mr. Davis worked closely with the paper and pulp industry in organizing and furthering participation in the Tree Farm and Keep Green programs. Prior to this he was a forester for the Carolina Div. of the Champion Paper & Fibre Co., where his activities included wood procurement, land management and conservation forestry.

J. E. Becker

Dr. W. R. Haselton

Rhinelander Promotes Two

At a recent meeting of the board of directors of Rhinelander Paper Co. at Rhinelander, Wis., John E. Becker was elected a vice president and assistant to the president. At the same time, Dr. William R. Haselton was appointed mill manager, in which position he will be responsible for the operation of the converting plant and by-products division, as well as the pulp and paper mills.

Mr. Becker joined Rhinelander in 1949 and held various positions, including those of West Coast sales representative and assistant sales manager. At one time he was an industrial consultant to the Office of Price Stabilization in Washington.

Dr. Haselton came to the firm in February 1953 as technical director. In October 1954 he was promoted to manager of manufacturing. Dr. Haselton holds a Ph.D. from the Institute of Paper Chemistry in Appleton.

Heritage Retires at Weyerhaeuser Timber

Clark C. Heritage, who has devoted more than 40 years to forest products and chemicals developments, has retired as development director for Weyerhaeuser Timber Co.

Mr. Heritage, one of the nation's foremost figures in pioneering new wood, fiber and bark products, will open his own office in Tacoma, Wash. He will serve industry in the establishment, planning and execution of research and development programs.

While Mr. Heritage will be concerned primarily with forest products, his future activity will not be limited to that field. His area of experience embraces organic chemicals, pulp and paper, and a variety of wood and bark products.

Following Mr. Heritage's retirement, Weyerhaeuser's research program will be directed by Dr. Winton I. Patnode, a chemist specializing in research and its administration. He was formerly with General Electric Co.

During Mr. Heritage's 18 years with Weyerhaeuser and Wood Conversion Co. — a former Weyerhaeuser subsidiary in Cloquet, Minn. — he pioneered whole-wood fiber for new uses in felts, boards and contoured articles. He has also contributed to the development of new products and processes in the fields of lumber, pulps, paper and paperboard, organic chemicals and dyestuffs.

Following graduation as a chemical engineer in 1914, Mr. Heritage served as a chemical engineer for Nekoosa-Edwards Paper Co. In 1916 he joined National Aniline & Chemical Co. and in 1926 executed the first development program for Cornell Wood Products Co.

From 1927 to 1929, Mr. Heritage was chief of the Pulp and Paper Div. of the U. S. Forest Service's Forest Products Laboratory at Madison, Wis. In 1929, he established Oxford Paper Co.'s research department at Rumford, Maine. He joined Wood Conversion Co. in 1937. When Weyerhaeuser Timber established its development center at Longview, Wash., he divided his time between Longview and Cloquet.

From 1934 to 1936, he served as president of Tappi and continues to serve that group as a member of its research appropriations committee. He is also a member of the fundamental research committee of CPPA.

Clark C. Heritage

D. J. McLaurin

Gilbert Names McLaurin

Don J. McLaurin has been appointed technical director of Gilbert Paper Co. of Menasha, Wis., manufacturers of cotton-content writing papers.

For the past five years, Mr. McLaurin has been chief of the Pulp and Papermaking Section of the Institute of Paper Chemistry at Appleton. Prior to that, he was associated with Powell River Co. Ltd., Spruce Falls Power & Paper Co. Ltd. and B. C. Pulp & Paper Co. Ltd., all Canadian firms.

Behrend Retires

Dr. Otto F. Behrend, co-founder and treasurer of Hammermill Paper Co. for more than 30 years, has retired from the firm's board of directors. He has been succeeded on the board by William L. Litle, president of Bucyrus-Erie Co.

Dr. Behrend has seen 56 years of

Names in the News . . .

continuous service as a Hammermill director, beginning with the incorporation of the company in 1899. He retired as treasurer in 1953.

Great Northern Names Lusby Mill Superintendent

H. L. Lusby of Jacksonville, Fla., has been made paper mill superintendent of Great Northern Paper Co.'s mill at East Millinocket, Maine where the second step of a $45,000,000 expansion program is nearing completion.

Mr. Lusby was formerly with St. Regis Paper Co. as paper mill superintendent at Jacksonville.

K-C Engineer Gets Tappi Appointment

Marvin Gade, systems engineer of the Instrumentation and Automation Section of the chemical engineering laboratory of Kimberly-Clark Corp.'s Research and Development Div., has been named chairman of a newly formed Tappi committee.

The committee on process instrumentation and control will function as part of Tappi's Engineering Div. Members include 18 instrumentation engineering specialists in the paper industry. Its purpose is to further expand research, development and application of process instrumentation and automation within the paper industry.

Key Promotions at Rayonier

Rayonier Inc. has announced that Russell F. Erickson, formerly vice president in charge of engineering and plant development, has been named vice president in charge of engineering and manufacturing. Formerly the resident manager of the company's Fernandina Beach, Fla. plant, he has been a vice president since 1950.

Harry A. Thurlow, at one time resident manager at the Port Angeles (Wash.) Div. and currently resident manager at Fernandina Beach, has been transferred to the manufacturing department in New York, N. Y.

George E. Scofield returns to Fernandina Beach as resident manager. Formerly assistant resident manager, he has for the past year been located at the new Jesup, Ga. plant as assistant manager in charge of manufacturing.

Lowell M. McGinnis moves up from assistant pulp mill superintendent to the assistant manager in charge of manufacturing at Jesup. A former shift superintendent at the Shelton, Wash. plant, he has been assistant pulp mill superintendent since the Georgia plant began operations in May 1954.

In another Rayonier appointment, Winston Scott has been named resident manager of the Shelton Div. He replaces George Cropper, who is taking an extended leave of absence. Mr. Scott was formerly assistant resident manager.

Stone Container Makes Two Appointments

A realignment and reorganization of top management functions and responsibilities has been announced by Stone Container Corp., Chicago. Under the changes, Marvin N. Stone and Jerome H. Stone hold new posts of executive vice presidents.

Marvin Stone, formerly vice president in charge of production, will direct and be responsible for all activities of W. C. Ritchie & Co., Chicago package manufacturing subsidiary; the paperboard mill divisions at Franklin, Ohio, and Mobile, Ala., and the containerboard division at Coshocton, Ohio.

Jerome Stone will direct and be responsible for all activities of the corrugated shipping container plants at Mansfield, Ohio, Chicago and Philadelphia.

Harper Named to Head New R-W Plant

Robert W. Harper, director of purchases for Rhinelander Paper Co., has been named resident manager of the Longview, Wash. plant of the new R-W Paper Co. His appointment was announced by Folke Becker, board chairman of the Rhinelander, Wis. firm.

R-W is jointly owned by Rhinelander Paper and Weyerhaeuser Timber Co. Its plant is now under construction, with operation scheduled for next year.

Mr. Harper has been associated with the Wisconsin company since 1932.

West Virginia Reports Charleston Changes

Several personnel changes were announced recently at the Charleston, S.C. plant of West Virginia Pulp & Paper Co.

T. A. Willington Jr., formerly pulp mill superintendent, has been named maintenance and construction general superintendent to succeed E. F. Libby. Mr. Libby retired on June 1 for health reasons but will continue with the firm in an advisory capacity.

Appointed pulp mill superintendent to replace Mr. Willington was R. W. Stoertz, whose position as technical service superintendent is being filled by Julius H. Mappus. Mr. Mappus was formerly assistant superintendent of technical services.

Northwest Paper Makes Organization Changes

The following changes in the manufacturing department of Northwest Paper Co. were recently announced by the firm:

Roy I. Nilsen becomes assistant manager of manufacturing with headquarters in the general offices at Cloquet, Minn. Succeeding him as manager of paper manufacturing at Cloquet is Warren C. Johnson.

Richard Maron will succeed Mr. Johnson as superintendent of the Cloquet machine room. And Sidney E. Strothman will occupy the newly created position of supervisor of beater rooms (at both Cloquet and Brainerd) under the jurisdiction of the respective managers of paper manufacturing.

Powell River Reveals Staff Changes

New appointments have been made by Powell River Co. Ltd. in conjunction with its 1955-56 development program centering around the announced installation of a ninth newsprint machine.

Norman Walton, former industrial engineer at Powell River, B. C., has been named engineering assistant to the chief engineer, Harold Moorehead. Promoted to control supervisor for the testing and statistics branches has been Victor Poole, former testing station supervisor.

Five engineers have been given special assignments in connection with the firm's latest expansion.

J. G. D'Aoust has been named senior project engineer. A. E. Card, development engineer, takes on additional responsibilities as groundwood mill project engineer. A. C. Mullen and G. E. G. Harrison have been appointed project engineers for the paper mills and wood preparation and service divisions, respectively. Appointed field supervisor of all construction work is W. G. Kennedy.

Industry Men Named to U. S. Chamber Committee

Four men representing the paper industry have been named by the Chamber of Commerce of the United States to its Natural Resources Committee for 1955-56. Forty-one outstanding business and civic leaders are members of the group.

The committee keeps the Chamber informed on developments and trends affecting forestry, mining, oil and gas, water resources and electric power. Chairman for the third year is Frank E. McCaslin, president of Oregon Portland Cement Co. of Portland, Ore.

Paper industry representatives on the committee are Peter D. Joers, vice president of Dierks Forests Inc.; Dr. Ernest Wohletz, dean of the College of Forestry at the University of Idaho; Earl Porter, manager of the Woodlands Div. for International Paper Co. at Mobile, Ala., and E. C. Rettig, first assistant general manager for Potlatch Forests Inc.

Advisory Group Named for Western Michigan

Bert H. Cooper, vice president of Kalamazoo Paper Co., has been re-elected chairman of the advisory committee on paper technology at Western Michigan College. New vice chairman of the group is C. M. Sisson, president and general manager of Mac Sim Bar Paper Co. in Ostego. Continuing as secretary is Dr. A. H. Nadelman, head of the paper technology department at the Kalamazoo, Mich. school.

Two men were added to the committee: Dr. J. J. Harrison, technical director and general superintendent of Michigan Carton Co. at Battle Creek, and Dwight L. Stocker, president of KVP Co.

Certificates of appreciation were presented by the committee to two retiring members: Martin J. Galbraith, technical director for Sutherland Paper Co., and J. C. Wood, KVP vice president.

K-C Appointments

In a realignment of management announced recently by Kimberly-Clark Corp. at Neenah, Wis., W. F. Cook was appointed assistant to the executive vice president. He will be responsible for developing a management man-power program for the firm and its subsidiary and associate companies. He is to be succeeded as Kimberly-Clark director of industrial relations by A. D. Wilkinson, manager of the Kimberly mill.

Succeeding Mr. Wilkinson at Kim-

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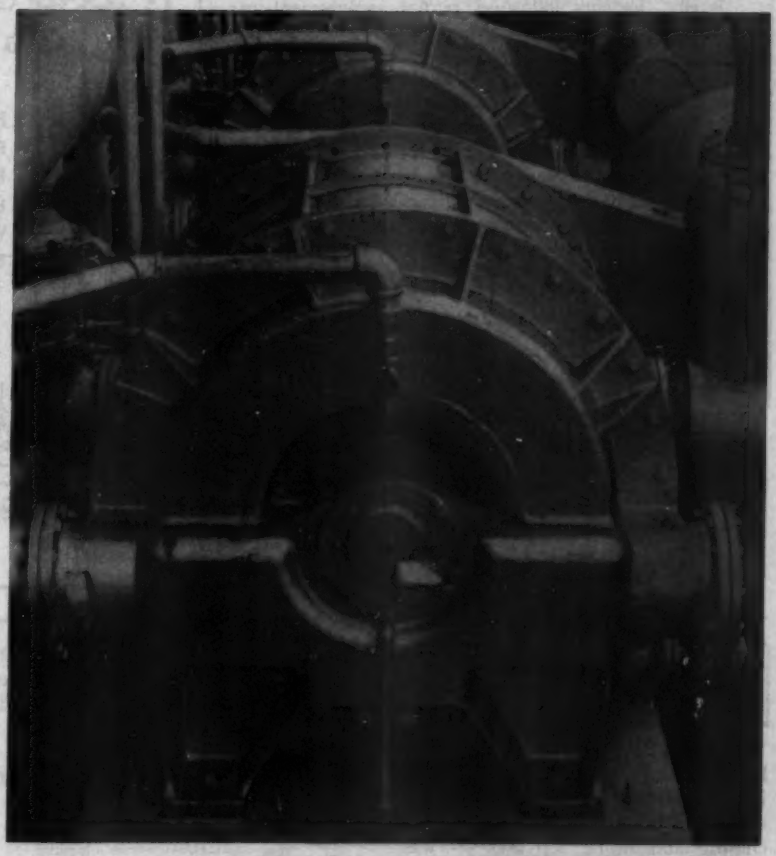

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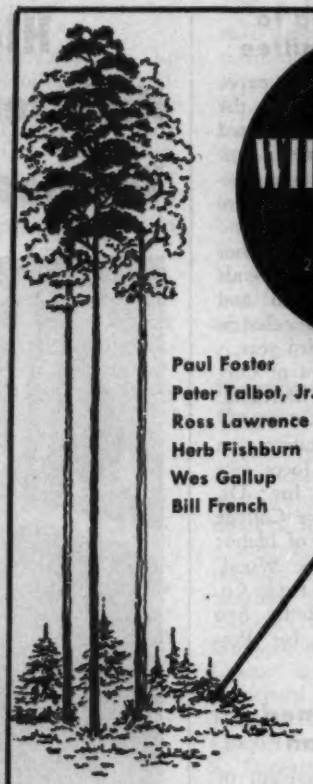

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Carrier Rope
Splicing Tissues
Deckle Webbing
Apron Cloth
Wire Brushes

Names in the News . . .

berly is H. W. Pierce, director of service operations. Named director of service operations — exclusive of purchasing and traffic activities — was R. W. Harker.

In another K-C appointment, G. Russell Johnson was named chief engineer to succeed James T. Whelen, who recently retired.

Champion Promotes Three

Howard F. Liscomb, a veteran of more than 29 years with the firm, has been named assistant general superintendent of paper manufacturing for the Ohio Div. of Champion Paper & Fibre Co. in Hamilton, Ohio.

Concurrent with Mr. Liscomb's promotion were the advancements of Albert H. Jackson to the post of superintendent of No. 2 mill and that of Melvin Sloneker to boss machine tender in the Hamilton plant's No. 2 machine room.

Mr. Liscomb joined the firm in 1926 and served in many capacities until 1937, when he was named machine tender at the Ohio Div. In 1952 he was named assistant to the machine superintendent of No. 2 mill and later was made mill superintendent.

Mr. Jackson has been with Champion for 32 years, while Mr. Sloneker joined the staff in 1926.

Bernard M. Hoey, who formerly was with the sales staff of Minnesota Mining & Mfg. Co., has joined Case Bros. Inc. of Manchester, Conn., as assistant to the president.

Dr. Darrel E. Mack, assistant to the vice president and technical director, has been appointed supervisor of the organic chemical research laboratory of Imperial Paper & Color Corp. of Glens Falls, N. Y.

W. Ronald Richardson, former assistant managing director and editorial director of American Forest Products Industries Inc., has joined Crown Zellerbach Corp. as assistant to the director of public relations in San Francisco.

William Wisinski has been named superintendent of the Los Angeles Corrugated Box Div. of Robert Gair Co. Inc. He had been general foreman of the plant since September 1954. He joined the firm 23 years ago as an operator on the corrugator at Bogota, N. J.

Wm. Wisinski

A. J. Singer

Anton J. Singer has been elected assistant secretary of International Paper Co. He joined the firm in 1934.

Aytch P. Woodson has been appointed to the board of directors of American Box Board Co. He was a director of Lewis Container Co. of Wausau, Wis., at the time it became a wholly owned subsidiary of American Box Board. Mr. Woodson, who resides in Wausau, is an officer and director of Mosinee Paper Mills Co., Masonite Corp., Employers Mutual Liability Insurance Co., Montana-

Dakota Utilities Co.; he is also a director of the Marshall & Ilsley Bank of Milwaukee and Marathon Corp.

W. Donald Bennett has been appointed forester and logging engineer of the Woodlands Research Div. of the Pulp & Paper Research Institute of Canada. He has been associated with such firms as Spruce Falls Power & Paper Co. Ltd. and Timberlands Machines Ltd. For seven years he was manager of the Woodlands Section of CPPA.

J. C. Gebbie

W. Buhler

Powell River Co. Ltd. has announced that **Jack C. Gebbie,** assistant personnel manager at Powell River, has been promoted to the industrial relations office in Vancouver, B. C., where he will work under Vice President W. C. R. Jones. Replacing Mr. Gebbie as assistant personnel manager is **W. Buhler,** former training supervisor.

Clare W. Hendee, forester for the California region since 1951, has been named an assistant chief of the U. S. Forest Service. In his new position he will direct and coordinate administrative operations, finances, personnel management, organization, civil defense, communications, business management, and public information and education activities.

John A. Luke, fourth generation descendent of the founders of West Virginia Pulp & Paper Co., has assumed duties as manager of the Luke, Md. mill. He succeeds Albert M. Kaiser, who has been assigned to technical studies.

Dr. Leslie M. Whitmore Jr. has been named to the research staff of the Sulphite Pulp Manufacturers Research League in Appleton, Wis. He was formerly head of the engineering section of the micro-biological pilot plant at Commercial Solvents Corp.

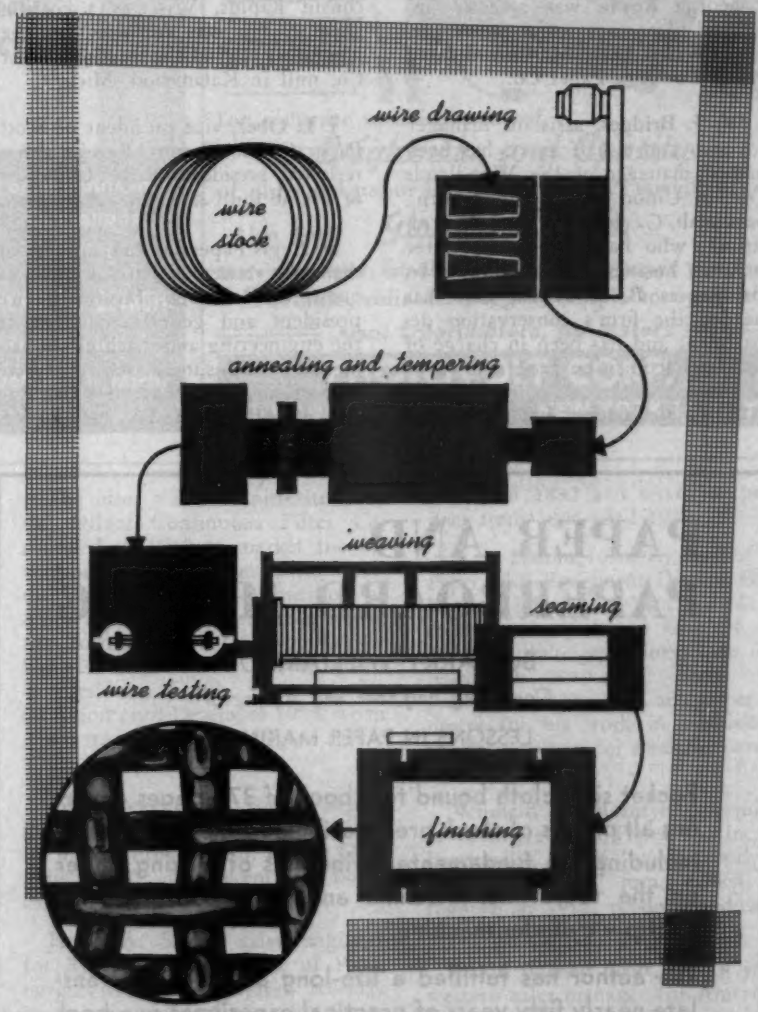
The promotions of **Stuart R. McIntyre** and **Robert M. Schantz** have been reported by Marinette Paper Co. at Marinette, Wis. Mr. McIntyre becomes finishing superintendent, while Mr. Schantz succeeds him as industrial engineering manager.

Lawrence C. Crowder, formerly general superintendent at Rome Kraft Corp. in Rome, Ga., has been appointed project engineer for the expansion program at the St. Regis Paper Co. mill in Jacksonville, Fla. He will have direct charge of all engineering and construction phases of the project, which includes the installation of a 1000-ton per day board machine.

L. A. Palmer has been named vice president and general manager of Donnacona Paper Co. Ltd. of Donnacona, Ont. He was formerly vice president and mills manager.

Dr. Gordon Peterson, Kimberly-Clark Corp. medical director, has been asked to serve as medical adviser to the Pulp and Paper Section of the National Safety Council.

Lawrence S. Pollock, president of Pollock Paper Corp., has been elected to the board of directors of St. Regis



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Names in the News . . .

Paper Co. (St. Regis recently acquired all the common stock of Pollock Paper, which has its headquarters in Dallas.)

A. J. Philip has been named vice president and general manager of Canada Paper Co. at Windsor Mills, Que. Prior to his present appointment, he was assistant general manager, resident at Windsor Mills.

George Royan was recently appointed plant engineer at the Appleton (Wis.) Div. of Consolidated Water Power & Paper Co.

W. J. Bridges, assistant manager for two and a half years, has been named manager of the Woodlands Div. of Union Bag & Paper Corp., Savannah, Ga. He succeeds J. J. Armstrong, who has resigned to enter private business. Succeeding Mr. Bridges is **B. E. Allen,** who has headed the firm's conservation department and has been in charge of the land acquisition program.

S. L. deCarteret has retired as chairman of the board of directors of Canadian International Paper Co. He has been associated with the pulp and paper industry 45 years. Mr. deCarteret will continue as a board member.

A. W. Soell, director of purchases for Gaylord Container Corp. of St. Louis, has been elected president of the National Association of Purchasing Agents for 1955-56.

Richard L. Savage has joined the Technical Department Coating Development Group of Consolidated Water Power & Paper Co. of Wisconsin Rapids, Wis., as a coating chemist. He was formerly on the laboratory staff at the St. Regis Paper Co. mill in Kalamazoo, Mich.

J. L. Ober, vice president of Scott Paper Co. at Chester, Pa., has been reelected president of the University of Maine Pulp & Paper Foundation.

St. Regis Paper Co. has announced the early retirement, at his own request, of **Robert P. Bushman,** vice president and general manager of the engineering and machine department. Mr. Bushman was executive vice president of Modern Valve Bag Co. of Allentown, Pa., which was acquired by St. Regis in 1941. He was made a St. Regis vice president in 1951.

Laurence T. Herman has been named executive director of both the Waxed Paper Institute Inc. and Waxed Paper Merchandising Council Inc. He was previously an advertising executive with the *Chicago Daily News.*

L. T. Herman

Paul Pauline

Paul Pauline, asistant to the sales manager, has been appointed marketing and research director for Wabash Fibre Box Co. of Terre Haute, Ind. He joined the firm in 1946 as a field representative.

Necrology . . .

Walter L. Dawson

Walter L. Dawson, president of Hamersley Mfg. Co. of Garfield, N. J., died recently in Passaic after a brief illness. He was 74. (Hamersley is one of the largest manufacturers of glassine and greaseproof papers in the East and the first mill to make greaseproof paper in the United States.)

Mr. Dawson joined the firm as an office boy in 1898, later becoming a member of the sales staff. He was one of the first to introduce the bakery trade to the use of waxed paper in the wrapping of bread — a process originated by Hamersley. He was promoted to sales manager and in 1938 was elected president and director of sales, a position he held until his death.

Henry Nias

Henry Nias, 76, chairman of the board and former president of Lily-Tulip Cup Co., died recently at his New York, N. Y. home.

Credited with the development of a machine to manufacture paper drinking cups, Mr. Nias in 1912 established Public Service Cup Co. He called his product the Lily cup.

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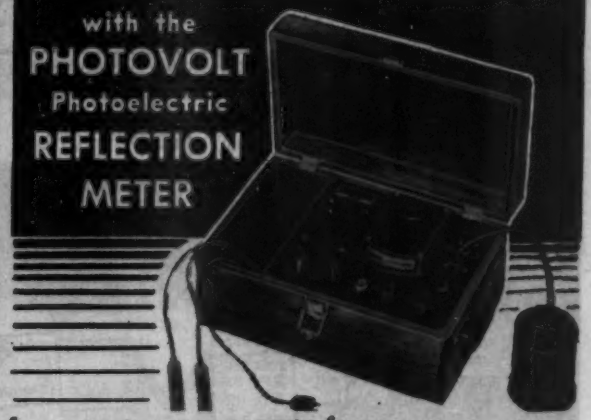

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In 1929, the firm was merged with Tulip Cup Co., and he became president of Lily-Tulip Cup Corp. He moved up to chairman in 1946.

Joseph G. Skirm

Joseph G. Skirm, 66, Bermico sales manager for Brown Co., died recently at Princeton, N. J.

Mr. Skirm, who also owned a small store in Princeton, served with Brown for 25 years. He was a graduate of the University of Wisconsin.

Edwin Letts Oliver

E. L. Oliver

Edwin Letts Oliver, noted mining engineer and founder-chairman of Dorr-Oliver Inc., died recently at the age of 77.

Best known for his work in the field of continuous filtration, Mr. Oliver developed the Oliver continuous filter in 1907, the first successful unit of its kind.

The filter was the cornerstone of the Oliver Continuous Filter Co. founded in 1910 to market the invention. Subsequent expansion and the development and acquisition of other related equipment resulted in the formation in 1928 of Oliver United Filters Inc. Mr. Oliver served as president of this firm from its inception until December 1954, when it was merged with Dorr Co.

John Treggett, 84, former superintendent of woodlands operations for Finch, Pruyn & Co. Inc. at Glen Falls, N. Y., died recently in Newcomb. He retired 10 years ago.

James A. Slater, sales engineer for Rust Engineering Co. of Pittsburgh, was fatally injured recently in an automobile collision. Mr. Slater had joined Rust in September 1954, prior to which he had been associated with Koppers Co. in sales and engineering capacities since 1934.

Edward Thomas Wilkinson, 91 retired president of the former Wilkinson Bros. & Co., New York, N. Y., manufacturer of paper and twine, died recently in Montclair, N. J. He joined the firm, which was founded by his father, in 1882 and served as president from 1896 until 1930.

A. L. Hamm, formerly head of the Paper Mill Equipment Div. of Combustion Engineering Inc., died recently in Long Island City, N. Y., after a prolonged illness. He had retired in 1949. Mr. Hamm was prominent in the pulp and paper industry for his work in establishing the basic pattern for modern recovery units.

Winfield E. McIntyre, president of McIntyre Bros. Paper Co. Inc. of Fayetteville, N. Y., died recently at his home. The firm, which he founded in 1912, produces industrial wrapping.

David Burnett Scott, for 18 years western sales manager for American Potash & Chemical Corp. until his retirement in 1952, died of a heart attack recently at his Altadena, Cal. home. He was 68.

George Andrew Gutches, 72, a former government forester and once a professor of forestry at Syracuse University, died recently after a long illness. He retired in 1947 from his post as timber valuation engineer for the Internal Revenue Service.

SAFETY NEWS

ELEVEN DEPARTMENTS OF Sonoco Products Co. at Hartsville, S. C., have received certificates from American Mutual Insurance Co. for having worked a total of 3,593,292 man-hours without a disabling injury. Four departments were honored for 250,000 safe man-hours, while seven smaller departments received two-year certificates. One of the most unusual safety records in the organization is that of the engineering department, which has worked 388,690 man-hours since its formation without a lost-time injury

St. Regis Vancouver Plant Completes Four Accident-Free Years

St. Regis Paper Co. has announced that its multiwall paper bag plant at Vancouver, B. C., has completed more than four years of operation without a lost-time accident. This represents approximately 904,500 man-hours of work.

The Vancouver plant has won seven national and local citations for superior safety records in 1954, including the National Safety Council's "Certificate of Commendation," the CPPA's Western Shield, and the award and pennant of the British Columbia Workmen's Compensation Board.

During the first six months of 1955, St. Regis' Printing, Publication and Converting Paper Div. (with mills at Bucksport, Maine; Deferiet, N. Y.; Kalamazoo, Mich., and Sartell, Minn.) achieved a 70 per cent decrease in its acident frequency rate.

The over-all lost-time accident frequency rate for St. Regis (including the Woodlands Div.) during the first six months of 1955 was 10.36, which represents a decline of 22 per cent from the comparable period of last year.

National Gypsum Record

Safety records were established during the first six months of 1955 at all plants of National Gypsum Co.

Reporting from the Buffalo, N. Y. headquarters, Merrill C. M. Pollard, safety director, declared that the firm's 37 operations had only six disabling injuries per 1,000,000 man-hours during the period. This, he said, compares favorably with the industry-wide average for the first half year, as reported by the Bureau of Labor Statistics. This figure was 11 disabling injuries per 1,000,000 man-hours.

Industrial Lab Mishaps Show Alarming Increase

A general increase in research and quality control work in large and small industries has resulted in an "alarming" increase in the number of laboratory accidents, according to J. O. Bengston, president of Chicago Apparatus Co.

In a recent report on laboratory safety, Mr. Bengston declared, "Many of these accidents are not the reportable type, and there is presently no statistical material available for comparative purposes. Our field men have reported, however, that the accident rate is increasing far beyond the rising rate of laboratory activity."

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Printers, Embossers, Folders, Interfolders, Waxers, Laminators, Wrapping Machines, Core Winders, Packaging Presses, Napkins and Napkins, Toilet Tissue and Paper Towel Units.

Mr. Bengston expressed the view that the accident increase indicates a lack of cooperation between laboratory personnel and company safety directors, as well as a failure to develop a proper mental attitude and a failure to make use of available safety devices and safety engineered tools.

He urged chemists and others engaged in laboratory work in industry to abide by safety rules and to use apparatus and equipment with safety features.

The heating mantle is "probably the most important single contribution to laboratory safety in a decade," Mr. Bengston continued. Other items include clamps, safety tongs, glass tubing manipulators, face shields, pipette fillers, goggles, respirators, asbestos and rubber gloves, air stirrers, stopper removers and bottle and carboy tippers. Another outstanding example, he said, is the heavily bonderized fume hood.

Scott Paper Co.'s Hollingsworth & Whitney Div. in Waterville, Maine, has honored 88 sulfite mill employees and their supervisors for completing more than 500,000 man-hours without a lost-time accident. The men received an award of merit from Liberty Mutual Insurance Co. for 509,524 hours from May 27, 1952, to December 31, 1954.

Association News . . .

Paper Napkin Association to Meet at Hot Springs, Va.

The fall meeting of the Paper Napkin Association will be held at the Homestead, Hot Springs, Va., on October 31 and November 1. Reports will be made by the chairmen of ten active committees: Executive, Federal Specifications, Finance, Increased Usage of Paper Napkins, Insurance, Membership, Statistical, Traffic, Wage-Data Survey and Weights and Measures.

The committee headed by G. G. Miller of Marathon Corp. has been eminently successful in solving many traffic problems for the paper napkin industry, which has resulted in substantial savings in transportation costs for this product.

Coming Events

Tappi

Oct. 13-14—Kalamazoo Valley Section, joint meeting with the Michigan Div. of the Superintendents Association, Occidental Hotel, Muskegon, Mich.

Oct. 19-21—Ninth Alkaline Pulping Conference, Hotel Patten, Chattanooga, Tenn.

Nov. 7-9—Tenth Engineering Conference, Rice Hotel, Houston, Texas

Nov. 8—Lake States Section, Wausau Club, Wausau, Wis.

Nov. 14-15—Tenth Plastics-Paper Conference, Brooklyn Law School, Brooklyn, N. Y.

Nov. 18-19—Southern Section, Dempsey Hotel, Macon, Ga.

American Pulp & Paper Mill Superintendents Association

Oct. 13-14—Michigan Div., joint meeting with Kalamazoo Valley Tappi, Occidental Hotel, Muskegon, Mich.

Oct. 21-22—Pennsylvania-New Jersey-Delaware Div., Pocono Manor Inn, Mt. Pocono, Pa.

Other meetings

Oct. 17-21—43rd National Safety Congress and Exhibition, Chicago

Oct. 20-21—Forest Products Research Society (Northeast Section), Prince George Hotel, New York, N. Y.

Oct. 31-Nov. 1—Packaging Institute, 17th Annual Forum, Hotel Statler, New York, N. Y.

Nov. 7-8—Forest Products Research Society, Mid-South Section, Peabody Hotel, Memphis

Dec. 5-9—25th Exposition of Chemical Industries, Commercial Museum and Convention Hall, Philadelphia

FOREIGN ABSTRACTS

Recording wood meters used as controls in groundwood mills

New instruments for recording the wood consumption of grinders are fully described and illustrated. The various pieces of equipment were constructed in the Central Laboratory of the Research Institute of the Finnish Pulp and Paper Industries at Helsinki, and have been accepted by a number of Finnish mills.

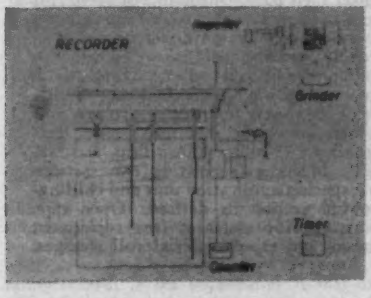


Fig. 1—Diagram of the principle of the recording wood meter

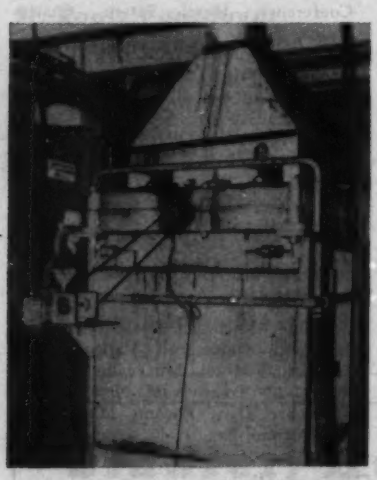


Fig. 2

The working principle of one meter (used in conjunction with continuously fed grinders) is shown diagrammatically in Fig. 1. Various modifications were made depending on the type of grinder used. In general an electric low-tension detecting element is introduced at the end of a suitable axle at the wood-feeding attachment. By means of a simple gear, this element can be adjusted so as to give one impulse for each 0.01 cubic meter of wood used. This impulse can be conducted to a central point (like an instrument panel) where the recorder may be placed. Fig. 2 shows the detecting element mounted on a Fuellner grinder. Modifications in recorders required for pressure grinders are also fully described.

A third wood meter type, also constructed by the Central Laboratory, is the so-called "sum recorder", which serves to give a summation of wood consumption in an entire mill, thus giving a mean consumption for each grinder. This is shown in Fig. 3. The work was actively assisted by several groundwood mills, which used the instruments supplied by the Central Laboratory.

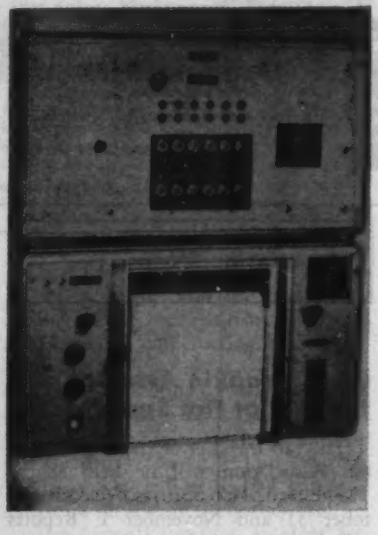


Fig. 3

The author also gives a series of graphs showing freeness and wood consumption as a function of time. Freeness as a function of wood consumption was also recorded, using two different grinders. The influences of various factors (like grinder load, type of grindstone, moisture content of the wood, and pit consistency) on the relationship between freeness and wood consumption were also recorded and discussed. Thirty-one half-tones and graphs. Georg von Alfthan, *Svensk Papperstidn.* 58, 503-512 (1955) (In English).

Formic acid in sulfite spent liquors

The authors have devised a greatly improved method for determining formic acid in spent liquors and in the condensates from relief gases obtained in sulfite cooks. The resulting data indicate that the amount of formic acid in such liquors is actually much lower than is generally supposed. The ratios of acetic acid to formic acid vary between 36:1 and 59:1.

In this method, 100 ml. of the sample are extracted repeatedly with ether. When the samples are very rich in sulfur dioxide, this is expelled prior to the ether extraction, in a current of nitrogen at 50° C. The combined ether extracts are treated with 50 ml. of water and titrated for total acidity with 0.1 molar sodium hydroxide. These solutions are then brought to a pH of 10 by means of sodium hydroxide, heated to 60° C. and treated with 0.5 molar barium chloride in slight excess. Any drop in pH is compensated for by the cautious addition of aqueous sodium hydroxide.

After ½ hour, the mixture is filtered, cooled and then run through a column containing Amberlite IRA-400 resin (previously converted to the acetate by treatment with sodium acetate, followed by thorough washing of the resin with water). After running the solution to be analyzed through this column at the rate of 3 ml. per minute, the formic acid held on the column is eluted with 50 ml. of 0.5 molar sodium carbonate and water, and the total eluate is evaporated to 50 cc. The carbon dioxide is then removed by adding 2 molar hydrochloric acid and shaking vigorously (the solution being acid to methyl orange).

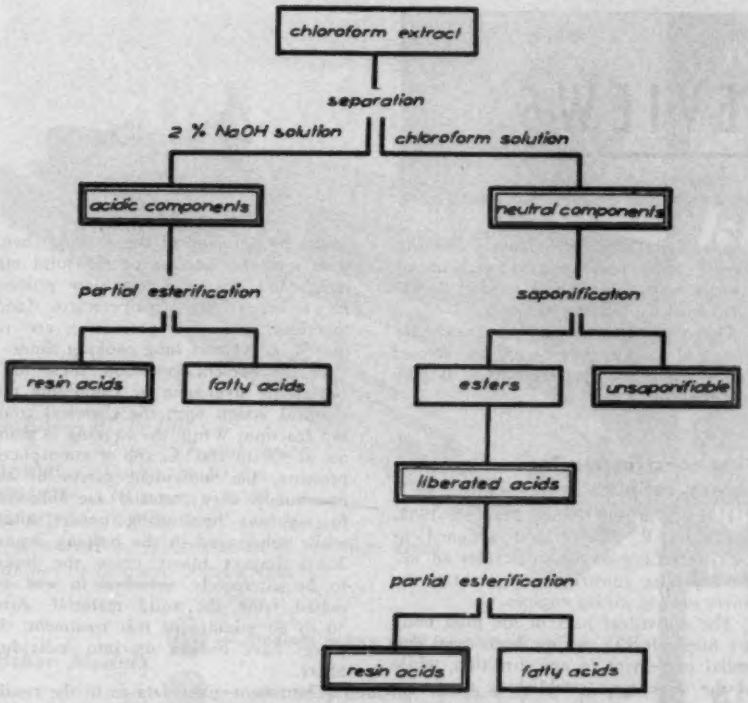
After adding 1 g. sodium acetate and 25 ml. of 5 per cent *mercuric chloride*, and heating 2 hours, the resulting *mercurous chloride* is filtered, washed with water at 40-50° C. and water and alcohol and then weighed. This weight multiplied by 0.0975 gives the weight of formic acid in the original sample.

A brief description is also given of an ion-exchange chromatographic technique for separating formic acid from sulfur dioxide. The results, although less accurate than those given by the other method, are promising. Thirteen references are given. Lars Ahlén and Olof Samuelson. *Svensk Papperstidn.*, 58, 421-424 (1955) (in English).

The distribution and composition of resins in sprucewood

This is the first of a series of papers that have a bearing on pitch troubles occurring in paper mills.

Acceptable spruce chips and the corresponding sawdust rejects passing through suitable screens are obtained from four different Swedish sulfite mills. All fractions are analyzed for their resin content



Main Components of Resin Extract from Accepted Chips (= C) and Corresponding Sawdust Fine Fractions passing 17.2 mesh (= S).

Table 1

Samples from mill no	Material	Acidic components in dry extract %	Neutral components in dry extract: total %	unsaponifiable %	esters %	acidic part of esters in %
I	C	17.4	81.6	64.0	18.6	66.7
	S	35.2	64.8	25.8	39.0	59.5
II	C	19.4	80.6	67.7	12.9	41.8
	S	40.4	59.6	33.4	26.2	69.1
III	C	15.2 (16.4)	84.8 (83.6)	62.6 —	22.2 —	33.0 —
	S	36.0 (35.6)	64.0 (64.4)	18.3 (20.0)	45.7 (44.4)	58.5 —
IV	C	20.8	79.2	60.8	18.4	—
	S	43.5	56.5	25.9	30.6	—
Mean value with its standard deviation	C	18 ± 2	82 ± 2	64 ± 2	18 ± 2	47 ± 9
	S	39 ± 2	61 ± 2	26 ± 3	35 ± 4	62 ± 3
Corrected values for overall wood entering chipping		19 ± 2	81 ± 2	60 ± 1	21 ± 2	51 ± 15

Fatty and Resin Acids in Resin Extract from Accepted Chips (= C) and Corresponding Sawdust Fine Fractions passing 17.2 mesh (= S).

Table 2

Samples from mill no	Material	Free Acids: of which Fatty acids %	Free Acids: of which Resin acids %	Esterified Acids: of which Fatty acids %	Esterified Acids: of which Resin acids %	Total Acids: in % on dry extract	Total Acids: of which Fatty acids %	Total Acids: of which Resin acids %
I	C	53.6	46.4	31.4	68.6	29.8	44.4	55.6
	S	66.8	33.2	41.0	59.0	58.4	56.5	43.4
II	C	43.4	56.6	34.6	65.4	24.8	41.5	58.5
	S	51.2	48.8	25.2	74.8	58.5	43.2	56.8
III	C	41.2	58.8	—	—	—	—	—
	S	61.0 (56.8)	39.0 (43.2)	31.4	68.6	62.7	48.5	51.5
IV	C	20.2	79.8	—	—	—	—	—
	S	29.3	70.7	26.8	73.2	—	—	—
Mean value with its standard deviation	C	40 ± 8	60 ± 8	33 ± 1	67 ± 1	27 ± 3	43 ± 1	57 ± 1
	S	52 ± 10	50 ± 10	31 ± 4	69 ± 4	60 ± 1	50 ± 4	50 ± 4
Corrected values for overall wood entering chipping process		40 ± 10	60 ± 10	33 ± 2	67 ± 2	29 ± 3	43 ± 1	57 ± 1

(as gaged by chloroform extraction), and these resins are then analyzed further for acidic and neutral components by a scheme shown in the accompanying diagram. The sawdust rejects, which represent only 0.5 to 2 per cent of the weight of the total wood, contain three to seven times as much resin as the acceptable chips.

When the total sawdust is screened further, the resin content of the finest particles rises even higher and, in one extreme case, reaches 15.6 per cent of the weight of the fine dust. Although this finest fraction is only about 15 per cent of the total sawdust, it contains over 60 per cent of the total sawdust resins. The resin content of the acceptable chips ranges from 0.51 to 0.84 per cent. Apparently the resin in sprucewood is either easily accessible in the resin canals or else it is enclosed in the parenchyma cells. It is the canal resin that is present in the fine sawdust.

The marked material differences between the resin in the chips (C) and that in the corresponding sawdust (S) are shown in the analyses given in Tables 1 and 2. The canal resin is estimated to contain about twice the amount of free acids plus esters, but less than half of the amount of saponifiable matter present in the total wood resin. Ernst Bact and Ove T. Carlson. *Svensk Papperstidn.*, 58, 415-20 (1955) (in English).

Hydrocyclone refining of pulps

A study was made of the efficiency of hydrocyclones in removing small bark particles from pulp suspensions. Variables that were investigated included pulp consistency, the diameter of the reject outlet, and the inlet pressure. Evidently pulp consistency is of major importance. Although the percentage of rejects increased with increasing diameter of the reject outlet, this variable was not too important in influencing the cleanliness of the resulting pulps.

The data are fully tabulated and illustrated by a series of twelve graphs. Five references are given. Lennart Stockman and Lennart Ruus. *Svensk Papperstidn.* 58, 483-90 (1955) (Original in Swedish with brief English summary).

The drying of printing inks

The author outlines the various ways in which printing inks dry. These include drying by penetration of the ink vehicle into the paper, evaporation of the solvent, oxidation of the "filmogen", thermal polymerization, gel formation, and "steam-" and "cold setting". The role played by paper during ink drying is also discussed briefly together with certain drying difficulties that may be ascribed to paper properties. R. Kirry. *Assoc tech. ind. papetiere, Bull.* 1955, No 3, 71-79 (In French.)

PATENT REVIEWS

MELVIN NORD*

Method of making a molded lignocellulose product

U.S. 2,708,637, issued May 17, 1955, to William T. Glab and assigned to Carr, Adams & Collier Co., describes a method of making a thermoplastic lignocellulose material.

Finely divided lignocellulose is mixed with a small amount of a strong alkali. The mixture is then heated to combine chemically a portion of the alkali with the lignocellulose. The product is a thermoplastic molding composition, capable of being molded under heat and pressure.

Further details are described in the patent.

Pulp screen

U.S. 2,707,905, issued May 10, 1955, to Wilfred F. Mathewson, describes certain improvements in pulp screens over the inventor's earlier patents 2,682,812 (1954), 2,525,701 (1950), and 2,450,838 (1948).

The principal improvement is the provision of means for flushing the clearance space of the screening unit, so as to prevent clogging of the unit by the accumulation of fibers.

Suction transfer assembly with deckle edge control

U. S. 2,709,398, issued May 31, 1955, to Edward D. Beachler and assigned to Beloit Iron Works, describes a paper machine pick-up assembly for transferring a moist paper web from a forming surface to a press section without simultaneously transferring severed deckle edges from the forming surface.

The advantages of this apparatus are that it is not necessary to dry the severed deckle edges, and that their reuse as pulp is simplified.

Plug construction for rotary refiners

U. S. 2,709,396, issued May 31, 1955, to Adam E. Bridge and assigned to the Black-Clawson Co., describes an improved plug construction for rotary refiners such as jordan engines.

The individual bars in the plug body are firmly locked against both axial and radial movement in any direction, while at the same time establishing maximum support for the bars against circumferential forces which arise when the plug is in operation.

Manufacture of paper pulp

U.S. 2,708,160, issued May 10, 1955, to Samuel I. Aronovsky and Elbert C. Lathrop, and assigned to the Secretary of Agriculture, describes a mechano-chemical pulping process for non-woody fibers such as straw or bagasse, which can be conducted at atmospheric pressure at reduced operating and equipment cost, at reduced pulping time, and with improved quality and uniformity of product.

The limiting factor in the cooking of straw, bagasse, etc., is the fact that the reaction takes place initially only at the surface of the solids. When the surface has reacted, the only further reaction occurs by diffusion of the cooking chemicals into the interior of the solid material, and this is a very slow process. As a result, high temperatures (and, therefore, increased pressures) are required, as well as long cooking times.

In the present invention, these difficulties are overcome by combining mechanical action with the chemical cooking reaction. While the cooking is going on, at 90° to 100° C. and at atmospheric pressure, the individual pieces of the non-woody fiber material are subjected to vigorous non-cutting impact blows while submerged in the pulping liquor. These impact blows cause the liquid to be alternately absorbed in and expelled from the solid material. After 30 to 60 minutes of this treatment, the pieces have broken up into individual fibers.

The patent gives data as to the results of this type of treatment in the production of strawboard pulp and fine pulp from wheat straw.

Acid sulfite pulping for chemical pulp

U. S. 2,709,652, issued May 31, 1955, to Mark Plunguian and assigned to Celanese Corp. of America, describes a process for the preparation of high purity wood pulp for the production of cellulose acetate and other cellulose derivatives by means of a sulfite pulping process which requires little or no subsequent purification steps.

Method of making laminated crinkled paper

U.S. 2,704,106, issued Mar. 15, 1955, to James F. Doyle and Paul L. Onasch, and assigned to Arkell Safety Bag Co., describes an improved process for making laminated crinkled paper for use in heavy duty bags.

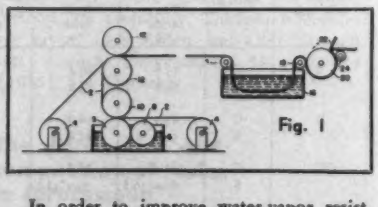


Fig. 1

In order to improve water-vapor resistance and to avoid bleeding or staining of the asphalt which binds the two paper webs together, a blend of airblown asphalt and a reclaimed rubber composition is used. The blend is prepared by heating the asphalt and rubber to about 400°F, in order to form a fluid mixture. The mixture is applied at 250-350°F.

*Patent attorney, 17600 Pinehurst, Detroit 21

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor or Assignee	Patent No.	Date
Drying apparatus for a paper web	Julien Dungler	2,700,226	1/25/55
Manufacture of coated paper	The Mead Corp.	2,700,621	"
Manufacture of composite board	Charles Roman	2,700,796	2/1/55
Method and apparatus for applying a wire to foundrinier machines	Valley Iron Works Co.	2,700,921	"
Collapsible partitioned carton	Sutherland Paper Co.	2,701,076	"
Carton	Robertson Paper Box Co.	2,701,088	"
Carton construction	United States Printing & Lithographic Co.	2,701,089	"
Covered collapsible triangular carton	Sutherland Paper Co.	2,701,090	"
Container	Kraft Foods Co.	2,701,091	"
Organic products from lignocellulose	Weyerhauser Timber Co.	2,701,255	"
Container for papers, notes, etc.	Allen L. Grammer	2,701,677	2/8/55
Pouring spout for cartons	Floseal Corp.	2,701,678	"
Dispensing container	Saul Goldstein	2,701,679	"
Carrying handle and closure for paper bags	Carl H. Weisheimer	2,701,680	"
Bottle carrier	Atlanta Paper Co.	2,702,144	2/15/55
Egg case	Waldorf Paper Products Co.	2,702,151	"
Reclosable container	Ex-Cell-O Corp. et al	2,702,152	"
Corner lock box	The Gardner Board & Carton Co.	2,702,153	"
Self-erecting box with locking bottom	Paper Package Co.	2,702,154	"
Shipping package	International Paper Co.	2,702,155	"
Improved cylinder for paper machine	Packaging Materials Corp.	2,702,497	2/22/55
Compartmented shipping container	Container Corp. of America	2,702,661	"
Lock bottom box	Fort Wayne Corrugated Paper Co.	2,702,662	"
Nested carton blank	Empire Box Corp.	2,702,663	"

MODEL AK

SPEEDS — 10′ to 100′
30′ to 150′ and faster.
MOTORS — 7½hp. to 40 hp.
WEIGHTS — 10 tons up to 40 tons.
CAPACITY — 84″ to 360″ and longer.
Mechanical or hydraulic head carriage drive for flat or concave bevel grinding.

Other Models. CK — medium heavy duty — capacity 32″ to 184″
HK — normal production — capacity 32″ to 108″

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As shown in Fig. 1, the paper webs 2 to be laminated are drawn from supply rolls 4. The adhesive mixture is applied in a coating to the inner side of one of the paper webs by means of a coating roll 5, which receives the mixture from a pan 6, a metering roll 8 and a pressure roll 10 cooperating with the coating roll. The webs are brought together between laminating rolls 12. They then pass over a guide roll 14, through a pre-soaking or conditioning tank 16 kept at about 200°F, and over guide roll 18 to a crinkling cylinder 20 where they are crinkled by means of a doctor blade 22, a rubber roll 24 engaging the webs in advance of the doctor blade.

Suction Molding Machine for Making Fiberboards

U.S. 2,696,146, issued Dec. 7, 1954, to Ralph Chapman and assigned to Forest Utilization Inc., describes a suction molding machine for forming fiber mats of large size, as an intermediate product in the production of fiber boards.

The apparatus is of the type which includes an intermittently progressing forming screen. The apparatus is shown in Fig. 2. It includes two major portions, a suction molding apparatus 10 and a white water tower 11. The suction molding apparatus consists of a lower suction box 12 and an upper deckle box 13. The screen 14 is advanced intermittently, each such advance permitting the formation of a new mat on one face of the screen and withdrawing a formed mat to position it in a cold press (not shown) in which most of the retained water is removed before hot pressing into a finished board.

When the screen comes to rest, the deckle box is lowered onto it to form a seal. Distributor pipes start to swing across the deckle box and return; flow through the distributor pipes is uniform and constant and may be regulated to deposit the desired amount of fibers in the deckle box. The white water tower suction box and the lower portion of the deckle box is filled with white water rushing through the screen. The amount of white water returned

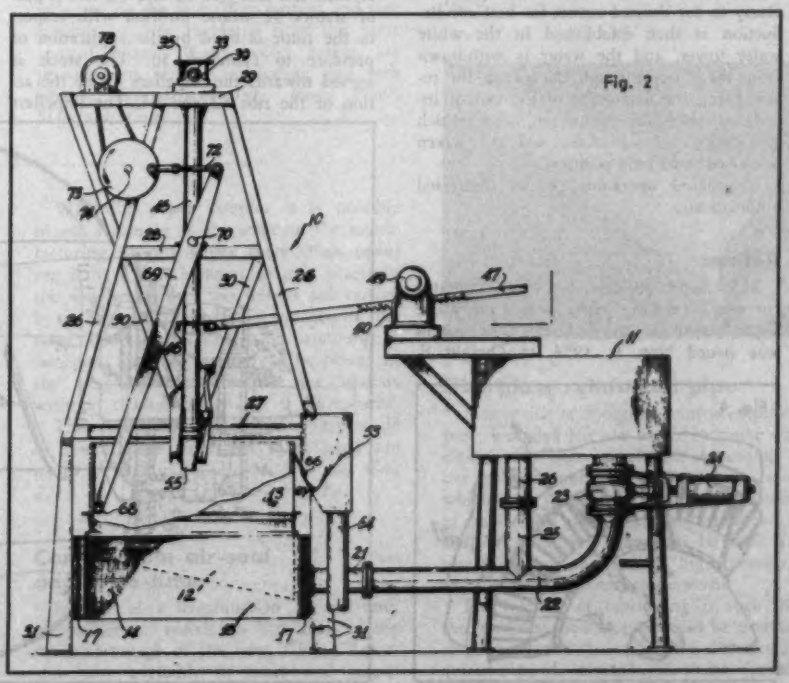

Fig. 2

CALLING ALL MILLS!

Here and now we're calling every mill in the land that is still struggling along *without* a Fulton Dryer Drainage (F.D.D.) system.

To all such mills we make these 5 points and on the strength of these 5 points, urge action.

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2. Practically every machine built in recent years has an FDD system.
3. Older and smaller mills are also rapidly installing FDD.
4. FDD will step up any dryer section—assure uniformly graduated temperatures under automatic control and make for faster, more uniform drying.
5. Close to 1000 FDD systems in service helping close to 1000 machines deliver greater tonnages of more acceptable grades—real profit makers.

Drop us a line for particulars. You're really missing a bet if you don't.

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Patent Reviews . . .

is such as to reduce the consistency of the slurry to the desired extent for best results. Suction is then established in the white water tower, and the water is withdrawn from the slurry through the screen, the result being the deposition of the mat of interlaced fibers on the screen, after which the deckle box is raised and the screen advanced to its next position.

The entire operation can be controlled automatically.

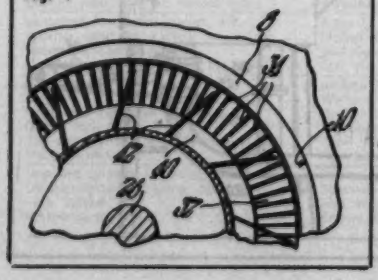
Refiner

U.S. 2,693,738 describes a disintegrator for use in making paper pulp from waste paper, rags, or wood fibers. The patent was issued Nov. 9, 1954, to Dwight E. Jones and assigned to E. D. Jones & Sons Co.

The apparatus is shown in Figs. 3 and 4. The essential features of the invention include a rotor 36 carrying impellers 42 at each end and ribs 62 and 64, and a pair of stators 32 whose position with respect to the rotor is fixed by the application of pressure to cylinders 50. The stock is moved towards the impellers 42 by the action of the ribs 62 and 64. The impellers and stators accomplish the disintegration and set up the circulation in the tank 2.

By minimizing agitation on the rotor, the stock is permitted to reach the impellers, instead of being thrown back into the tank. According to the inventor, such turbulence as occurs in the conventional types of apparatus is unnecessary and undesirable. He claims that his apparatus results in improved quality of pulp and rate of production.

Fig. 4



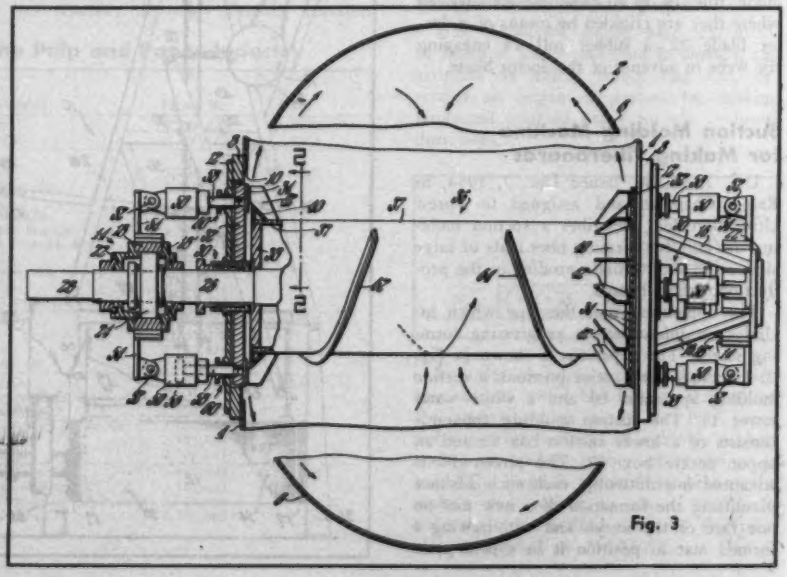
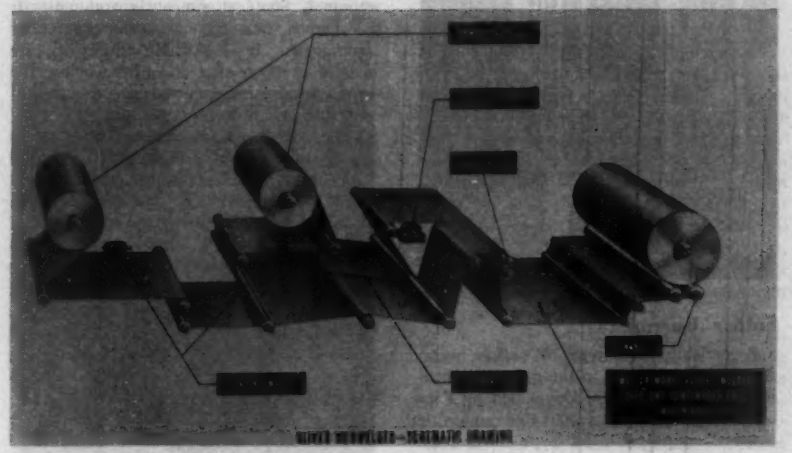


Fig. 3

NEW PRODUCTS



Side roll splicing machine

A completely new unit, designated the Oliver Webwelder, has been developed for the splicing of side rolls of paper. This unit will firmly join together as many as five narrow rolls of paper to produce a single finished roll up to 85 in. wide. The necessity of repulping side rolls is thereby almost completely eliminated and salable mill capacity increased as a result.

According to the manufacturer, the Webwelder produces a highly acceptable finished product. The tensile strength of welded stock is equally as great as that of unwelded stock, and the weld, although visible, is the same caliper as the remainder of the roll. This unit is particularly recommended for corrugating medium or other heavy grades of paper.

Basically, this unit comprises two or more stands from which the rolls or webs are unwound, rotary grinders which bevel the edges to be joined, a dust collection system, precision glue applicators, a series of guide or threading rolls, compression rolls which firmly press the glued edges together and a rewinder for the finished roll. Power sources for the rewinder and compression rolls is a vari-speed motor controlled from a small panel board mounted on the unit. Web tension and side register are also regulated from this same control board. Water-cooled brakes are provided to control unwinding and web tension. *Dorr-Oliver Inc., Barry Place, Stamford, Conn.*

Paper sampler

A new device, known as the M & W — Cannan paper sampler, which snatches samples from webs moving at machine speed without danger of costly shutdowns caused by tears and pile-ups, has been introduced to the market. This device uses a semi-circular toothed cutter which snaps against a cutter plate to give an accurate and smoothly folded circular sample from any position on the web. It cuts the sheet so quickly and cleanly that the possibility of tearing is virtually eliminated, it is claimed. The sampler also represents an important safety advance because it keeps hands and arms out of fast-moving machinery.

Moisture content is said to be determined much more accurately with the paper sampler than by catching samples with the thumb and finger. With the former method no moisture is squeezed out.

With the paper sampler it is possible to get a sample at any stage in the manufacturing process where there is an opening 6 by 6 in. or larger to gain access to the web and where the web is not carried by a felt. Each sample is cut exactly the same size as the others, no trimming is necessary, and the sample can be placed in the weighing bottle within five seconds with no chance to dry out, it is reported.

The cutter and cutting plate are made of tough alloy steel. All other parts are made of aluminum. *Moore & White Co., 2713 N. 15th St., Philadelphia, Pa.*

Combination air-seal and cycle-timer

Service as a combination air-seal and cycle-timer at speeds to 500 rpm is the main advantage of the new Timing Rotorseal now available to users and manufacturers of presses and other machine tool equipment. Compact in design and size, this product is said to be completely self-contained and sealed, protecting the electrical circuit and timing mechanism from dirt and oil. By combining two functions into one simple mechanism, the need for extra shaft space formerly occupied by cam limit switch, sprockets, timing chain and complicated mountings is eliminated, according to the manufacturer.

Timing of the operating cycle is accomplished by multiple limit switches which control air pressure to the clutch and brake. The design of the Timing Rotorseal provides for 360° adjustment (clockwise or counterclockwise) of the flat of the cams with respect to a point on the crankshaft.

The Timing Rotorseal may be obtained as a unit complete in itself or as an integral part of the Standardized Press Application, a low-cost package unit for converting O. B. I. and straight-side presses from mechanical to pneumatic clutch and brake.

Two types of mountings are available: (1) flywheel hub-mounted for clutch element inboard of flywheel as in Standardized Press Application; and (2) shaft-mounted for clutch element mounted outboard of flywheel. Three sizes of the adapter are available to fit variations in size of the flywheel hub. *Fawick Airflex Div., Fawick Corp., 9919 Clinton Rd., Cleveland 11, Ohio.*

Fiberglass reinforced pipe

A new line of fiberglass reinforced plastic pipe, intended for use under corrosive conditions, has been developed. According to the manufacturer, the thermosetting resins which are used give excellent resistance to most acid and alkaline solutions. In addition, this new pipe can be built for service where moderately high pressures and temperatures are encountered.

The method of fabricating is such that the fiberglass reinforcement can be oriented to provide needed strength for different requirements. A selection of resins (princi-

New Products . . . . . .

pally modified expoxies) is available for special needs.

Nominal inside diameters of 1¾, 2, 2½, 3, 4, 6, 8, 10, and 12 in. are available and lengths are 20-ft. random except on the smallest diameters, which are 10 and 15-ft. random. It is said that manufacturing methods are such that almost any diameter and wall thickness, up to 36 in. diameter, could be supplied on a custom-built basis without excessive tooling costs.

Couplings and other fittings of several types are available with standard sizes and cost varies with the construction required. *Reinforced Laminates, Inc.*, 3055 *E. Hennepin Ave., Minneapolis* 13, *Minn.*

Papermakers' felts

A new chemical development, the 4-D treatment, is said to change the physical and chemical characteristics of wool fibers used in the manufacture of papermakers' felts, making them tougher while also stabilizing wool's normal tendency to stretch.

According to statements issued by the company, the new 4-D treatment actually adds a fourth dimension to felt performance, improving all three of the felt dimensions: toughness, finish and openness. The company states that 4-D increases toughness without sacrificing either openness or finish, maintains finish without sacrificing either toughness or openness and improves openness without sacrificing either toughness or finish. It also protects against both bacterial and chemical attack. *F. C. Huyck & Sons, Rensselaer, N. Y.*

Concrete patching material

Broken or cracked concrete floors, steps and driveways may now be successfully patched with liquid Cement Bond, according to the manufacturer. It is brushed on the old concrete surface to bond the new patch to it. It is claimed that the patch will stay in place indefinitely, withstanding heavy traffic conditions equally as well as the surrounding concrete. Severe fracture tests are said to leave the bond undisturbed (see photograph).

This new patching material, according to the manufacturer, is clean and simple to use. The hole is chiseled out to a depth of one-half inch, cleaned, dampened and Cement Bond brushed on. After a half-hour wait, or overnight, the new mix is troweled in, and the job is complete.

A new floor can be laid over an old one with Cement Bond, it is claimed, saving the high cost of breaking up an old floor to re-lay the new. The new floor should be not less than a half-inch thick right to the edge and should not be feather-edged. New steps should be formed with a rounded nosing. *Tropical Paint Co., Cleveland* 2, *Ohio.*

Sulfur burner

A radically new type of sulfur burner is now being offered to the pulp and chemical process industries. Developed by Kimberly-Clark Corp. and marketed under the name Chemipulp-KC Jet Type sulfur burner, the new burner is available in capacities of 1, 2½, 5, 12, 15 and 25 tons per day.

In the new burner, molten sulfur is sprayed into the burner as a fine mist, and secondary air is then introduced in several stages. According to the manufacturers, the result is clean operation and long service life. It is claimed that the burner operates efficiently at all SO_2 gas concentrations between 12 and 18½ per cent. Operating at 2100° F, the new burner will burn dark sulfur as well as light sulfur at loads of 25 to 150 per cent of rated capacity. The burner comes up to 2100° quickly, thus minimizing production of SO_3, and shutdown is instantaneous.

Another important feature, according to the manufacturer, is the fact that the new burners are unusually compact, requiring only a fraction of the space taken up by rotary burners and combustion chambers of equal capacity. *Chemipulp Process Inc., Watertown, N. Y.*

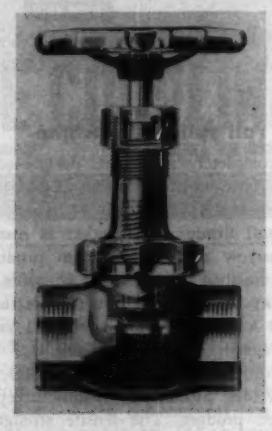
Rotary mechanical shaft seal in cartridge assembly

A new rotary mechanical shaft seal in an easily-replaceable cartridge assembly is now on the market. This new seal has been designed especially for service in fluid mixing applications. It is now available in either single or double types on all models of "Lightnin" mixers where shaft sealing is required and in a variety of materials to suit any fluid mixing conditions. The single seal assembly is used in applications where the sealing faces are lubricated by the tank contents and where service conditions are not severe. The double seal (illustrated) is applied to mixers when the tank contents will not lubricate the sealing faces, when there are abrasives in the contents, or when conditions of high temperature or pressure are present.

Positive, leakproof sealing of tank liquids, vapors or gases is provided by the new seal, according to the manufacturer, who also claims that the seal never requires adjustment while in service.

The seal is assembled in a cartridge as a single component. Using a wrench, the assembly can easily be uncoupled, removed and replaced in a few minutes without dismantling the mixer or removing it from the tank and without emptying the tank, it is reported. Shaft alignment is automatic. It is claimed that through a locking collar arrangement it is possible to replace the seal of a mixer that is entirely below the liquid level, or on a pressure vessel, without loss of product or pressure.

The double seal assembly is available in types suitable for pressures up to 1200 psig and for temperatures ranging from −120° to +485° F. Materials include stainless steel, "Stellite," bronze, ceramic, "Hastelloy," and "Teflon." Special designs also can be provided for other conditions of temperature, pressure, etc. *Mixing Equipment Co., Inc.*, 158 *Mt. Read Blvd., Rochester* 11, *N. Y.*



Bronze globe valve

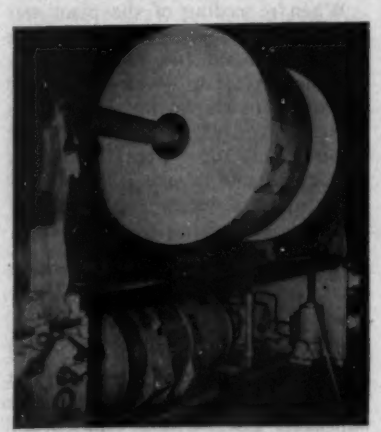
A revolutionary new bronze globe valve, the LQ600, claimed to be radically different in design and engineering, has been introduced.

The manufacturer states that during a four-year testing program, the LQ600 valve has never failed or leaked—even in installations where other valves had been replaced regularly from month to month. This is made possible by a combination of two new elements. The first is a new seating metal patented under the name "Brinalloy." This new alloy is not surface-hardened, but hard all the way through. It is said to resist wear and corrosion even more than 500 Brinell stainless steel and far more than case-hardened stainless steel exceeding 1000 Brinell.

The second element is the flat-seat design of the valve, usually considered impractical for throttling service because ordinary seating materials fail rapidly by wire drawing. The manufacturer states, however, that Brinalloy is so resistant to wear and corrosion that it can be fused permanently into the valve for its entire service life. It is claimed that the Brinalloy

seats and discs in the LQ600 valve do not require replacement, renewing, or regrinding.

This new valve features a different exterior design, simple and streamlined in appearance. The valve has the Stemalloy stem, which is said to eliminate valve failure from stem-thread wear. It is operated by the Non-Slip handwheel. Other features include durable, high-strength bronzes in body and bonnet, and true backseating, permitting safe and easy repacking under pressure. *Lunkenheimer Co., Box* 360, *Cincinnati* 14, *Ohio.*

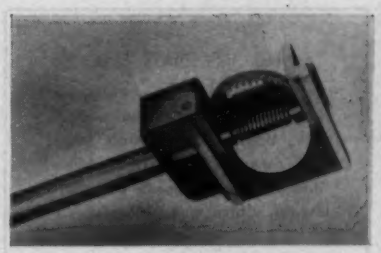


Slitter-rewinders

A new line of slitter-rewinders is now available. This new line includes several models of single and duplex rewinders and two drum riding roll winders for both score and shear cut. Duplex rewinders have a completely new hydraulic system and other design improvements. They are built in widths from 42 to 72 in. for speeds up to 1500 fpm.

Other new designs completed include a foil spooler and separator for speeds up to 2000 fpm and two models of Dilts two drum riding roll winders in widths from 72 to 130 in. for speeds of 1500 and 2000 fpm.

Soon to be available are two additional models in widths from 42 to 82 in. for speeds from 1000 to 2000 fpm. *Dilts Machine Works Div., Black-Clawson Co., Fulton, N. Y.*



Hydromatic valve

The hydromatic single control valve is used on ion exchange water softener and demineralizer equipment to control the various steps of operation during regeneration. The hydromatic design includes a number of internal diaphragm-operated individual valves faced with soft rubber which insures drop-tightness and non-scoring, according to the manufacturer. This feature, it is claimed, eliminates the possibility of hard water or regenerant contaminating the treated water.

The entire operation of the valve is accomplished hydraulically. By turning the small pilot valve and utilizing main line water pressure to operate the diaphragm valves, each step of the cycle is initiated in proper sequence. Built-in backwash and rinse rate controllers automatically adjust flow for variations of inlet water pressure. According to the manufacturer, the individual diaphragm valves are easily accessible and replaceable and require little maintenance.

The hydromatic valve may be manually operated or automatically operated with only a 40-w motor and sequence control. Motor operation is said to make this valve especially adaptable to completely automatic water conditioning installations. *Cochrane Corp., Philadelphia 32, Pa.*

Speed reducers

The new "Line-O-Power" speed reducers with capacities ranging from fractional hp to 150 hp are now on the market. According to the manufacturer, the two most important basic features of the new models are simplicity and compactness of design and exceptional durability of all components.

The new speed reducers employ Duti-Rated lifetime gears to provide higher capacities in a compact unit. In addition, the input and output shafts are in a direct line to permit coupling of motor and speed reducer in less space. Another feature is the Spline Drive pinion, making it easy for the user to change reduction ratios. The range of nominal ratios for double, triple and quadruple reductions is from 5.06 to 1478. *Foote Bros. Gear & Machine Corp., 4545 South Western Blvd., Chicago, Ill.*

Stainless steel breaker trap

The introduction of an all stainless steel breaker trap has been announced. Shell, end plates, rotor and vaned stator insert are all of cast stainless steel. Longer life and lower maintenance are claimed wherever corrosion is a problem. According to the manufacturer, this stainless steel model will increase the possible applications for this equipment. *Sutherland Refiner Corp., Broad Street Bank Bldg., Trenton, N. J.*

Line-operated pH meter

A new line-operated pH meter, Model 110, is now on the market. This instrument incorporates a large-size indicating meter of 7 in. scale length which covers the entire pH range from 0 to 14 without switching and without reversal of the pointer travel, according to the manufacturer. This model is intended mainly as a laboratory-type instrument but can be furnished in a portable shape with baseboard and carrying cover. The available accessories include a swing-arm adapter for immersing the electrodes by tilting motion and a shielding hood for use of unshielded electrodes.

Model 110 is said to incorporate the most recent advances in electronic tubes

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and circuits. According to the manufacturer, it is perfectly stabilized and can be used on any voltage from 80 to 260 v 40/60 cycles ac. Accuracy of 0.02 pH unit is claimed. *Photovolt Corp., 95 Madison Ave., New York 16, N. Y.*

Pipe fittings

The first 3- and 4-in. pipe fittings of unplasticized polyvinyl chloride (PVC) to be injection molded on a commercial scale are now being marketed, including 90° and 45° elbows, tees, couplings, and flanges.

It is claimed that the larger size PVC fittings make possible the economical erection of the larger size PVC piping systems now being planned in the chemical, petroleum and other fields.. All of the fittings, from ½-in. up, are available in normal and high impact PVC and in threaded and socket types, the latter designed for attachment to pipe by solvent or fillet welding.

According to the manufacturer, PVC piping installations provide exceptional resistance to corrosive attack and are easy to erect and disassemble. *Tube Turns Plastics, Inc., 224 E. Broadway, Louisville 1, Ky.*

Resins

Scriptite 50, 52, and 54, three resins newly developed for the paper industry and tested for more than a year, are now available commercially.

Scriptite 50, a water soluble polyelectrolyte, is recommended as a surface size for paper and paperboard. Easily applied by conventional surface sizing techniques, this resin is said to offer an effective means of improving the strength of paper as measured in terms of wet and dry tensile strengths, Massachusetts Institute of Technology fold tests and Mullen tests. Under normal conditions it requires no additive. It also improves the porosity of the paper and improves the printability.

Scriptite 52, another polyelectrolyte, is insoluble in water, but soluble in aqueous alkali. Used as a sizing agent, it is particularly useful in increasing water resistance and wet strength. Additions of formaldehyde to the resin solution bolster these properties still more, and in either case, the properties are unaffected by acid conditions and high temperatures. Since the resin is still soluble in alkali after the paper or paperboard is dried, the broke can be reclaimed by hydrolysis under alkaline conditions.

Scriptite 54 is a partial ester of a long chain resin containing carboxyl groups. Insoluble in water, it is soluble in alkalis and several organic solvents. As a paper coating, this resin produces high resistance to water, wet rub, and bleed, according to the manufacturers, who also claim that the coating features high gloss, toughness, good adhesion and good printability. It is suggested as an adhesive in clay coating, as a topcoat on colored or coated paper, as a pigment binder in base coating and as a glossy, water resistant coating for decorative papers such as wallpaper. *Monsanto Chemical Co., Dept. SO, Springfield, Mass.*

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Sonoco Products Co.

(Continued from page 637)

have a period of good operation which lasted from July through mid-October. Average flow figures during this time were:

Waste water flow, gpm	500
Lbs. BOD removed per day	1758
BOD Conc. — influent, ppm	340
BOD Conc. — effluent, ppm	43
Efficiency	87%

During this period, the flow was approximately 7 per cent semichemical and the balance chip board. Air consumption was approximately 2000 cfm. Since the total paper mill waste load per day to the stream varies during the summer from about 8,000 to about 16,000 lbs. BOD, and since we also operate a 375-gpm spray farm for semichemical water during summer months, we cannot accurately say what percentage of the total BOD load from the paper mills was handled by the bio-oxidation plant.

Plant operations steadily became worse from November until January, primarily due to the microscopic filamentous growth that developed. By January, flow to the plant had dropped to 275 gpm, and efficiency was down to 56 per cent. In late January, when it looked as if we had the sludge problem solved, another headache developed. The expansion joints opened up due to excessive settling of the tank, and the leakage became so much that a sufficient rate of sludge build-up could not be maintained. Thus, it was necessary to drain the tank and repair the leaks.

The repair period was much longer than we anticipated, lasting from early February through mid-March. The first effort to seal the joints failed, but the second effort proved successful. The material used was an asphaltic expansion joint cement. At present, the joints are water-tight.

When re-seeding of the plant was started, sludge from the city sewage plant was unavailable, and it was decided to attempt to develop sludge by aerating our chipboard water. This proved successful, and the re-seeding required only three weeks before the sludge was able to take a flow of 700 gpm chipboard water.

One year's operating costs and conclusions

Total operating costs, from April, 1954, through March, 1955, is $14,960.60, for an average of $1,246.72 per month. Included in this cost is that of the additional overflow weirs, the adjustable gate between aeration and clarifier, and the expansion joint repairs.

After operating a bio-oxidation pilot plant for one year, we have the following comments and conclusions:

1. This type operation will successfully treat our paper mill waste waters.
2. Week-end shutdowns of our paper mill production will have no bad effects on the bio-oxidation operations. After providing black liquor feed for only a few week-ends, we concluded that this operation was not necessary.
3. The plant has not yet successfully handled the BOD load that we anticipated. For last summer's operation we removed an average of 39.5 lbs. BOD per 1000 c. ft. of aeration tank per day. This is higher than most municipal plants but well below the operation of the pilot plant at Macon Kraft Corp., which averaged 78 lbs. We do not believe we have yet reached the top efficiency of this type operation on our waste waters. We are contemplating equipment changes which will enable more efficient operation and more complete evaluation by the end of this summer's operation.
4. We consider the operating costs high. We hope that this cost will be reduced. We definitely feel that the plant can be operated satisfactorily with the equivalent of one operator for one shift per day.

NEW LITERATURE

Books

FOREST REGENERATION IN ONTARIO. (University of Toronto Forestry Bulletin No. 2). By R. C. Hosie. Published for the Research Council of Ontario by University of Toronto Press, Toronto, Canada. 6 x 9. 134 pages. Paper-bound. $2.00.

This review reports all information presently available from the 57 regeneration surveys conducted in the province during the period 1918-1951 by government and private agencies.

This review of surveys is divided into two parts. The first part presents a general view of the nature of tree reproduction on cut-over forest land in the province, followed by an analysis of the procedure used in conducting and reporting regeneration surveys and by sections giving conclusions and making recommendations about the conducting of future surveys. In the second part, the abstracts of the surveys reviewed are arranged chronologically under the names of the agencies responsible for the original reports. Numerous photographs, tables and a map are included.

THE DICTIONARY OF BUSINESS AND INDUSTRY. Edited by Robert J. Schwartz. Published by B. C. Forbes & Sons Publishing Co., Inc., 80 Fifth Ave., New York 11, N. Y. 5¾ x 8½. 561 pages, $7.95; with thumb index, $8.95.

A total of 45,000 business and legal terms, most of which cannot be found in the average home, office or collegiate dictionary, are defined in this volume. Included are trade names, trade terms, commonly used trade abbreviations, and legal terms.

In addition, the dictionary contains 36 pages of charts and tables dealing with coins and notes of the world, foreign weights and measures, weights of materials, foreign trade definitions, conversion factors, square cubes, square roots and cube roots, units of measurement, etc.

THE COLLOID CHEMISTRY OF SILICA AND SILICATES. By Ralph K. Iler. Published by Cornell University Press, 124 Roberts Place, Ithaca, N. Y. 6¼ x 9½. 324 pages. $5.50.

The purpose of this book, according to the author, is to assemble and correlate information relating to the behavior of silica and silicates in the colloidal state so as to present a coherent picture of such pertinent phenomena as solubility, formation, and behavior of colloidal particles and surface chemistry of the solid phase. Also, in the final chapter of this volume, a brief review of the occurrence of soluble and colloidal silica in biological systems is presented.

Topics covered in the nine chapters of this book are as follows: Silica-Water System; Soluble Silicates; Chemistry of Silicic Acid; Esters of Silicic and Polysilicic Acid; Colloidal Silica; Amorphous Silica Gels and Powders; Colloidal Silicates; Surface Chemistry of Silica and Silicates, and Silica in Living Organisms. Information has been drawn from references not only in chemistry, but also geology, mineralogy, agronomy, zoology, and many phases of industrial chemistry.

TECHNIQUES OF PLANT MAINTENANCE AND ENGINEERING. Published by Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N.Y. 218 pages. Paperbound. $7.50.

This book is made up of the papers that were given at the annual Plant Maintenance and Engineering Show of 1955, the stenotypist's transcript of the discussions that followed them, and reports of the round table sessions at which specialized phases of the maintenance function were given intensive consideration.

Subjects covered in this book include: What Management Wants from Maintenance and What Maintenance Wants from Management; Control of Maintenance Activities in the Process Industries; Standardization and Work Measurement; Maintenance Cost Control; Sanitation; Work Measurement and Work Standards; Training the Maintenance Force; Advantages of Planning and Scheduling, and Managing the Maintenance Organization. In the section covering round table discussions several subjects covered are: Corrosion Prevention and Control, Lubrication, Safety and Fire Protection, Power Plant Equipment, Steel Mills, Textile Mills and Maintenance Manuals.

Booklets and Pamphlets

TREE IMPROVEMENT RESEARCH AT THE LAKE CITY, FLORIDA, RESEARCH CENTER. (Station Paper No. 45). A Project Analysis. By Francois Mergen and Kenneth B. Pomeroy. Published by Southeastern Forest Experiment Station, Asheville, N. C. 8 x 10½. 60 pages. This booklet on tree improvement research contains the following main divisions: Discussion of the Major Problems; Review of Past and Current Work; Needed Information; Research Aspects of Problem, and Proposed Program. An extensive bibliography is presented. The appendix contains eight tables. The last section lists and briefly describes species improvement field installations.

FARM WOODLAND MANAGEMENT IN THE SOUTHERN APPALACHIANS. An 8-year summary (Station Paper No. 41). By Robert A. Campbell. Published by Southern Forest Experiment Station, Asheville, N. C. 8 x 10½. 10 pages. To determine the actual returns possible from planned farm woodland management and to provide demonstration woodlands, four separate areas in the Bent Creek Experimental Forest, near Asheville, N. C., were set aside in 1945. This report presents data based on eight years of cutting on these areas.

RUBBER ROLLS. Published by Rodney Hunt Machine Co., Orange, Mass. 7¾ x 10½. 60 pages. $2.00. (Free to roll users). This authoritative treatise on rubber rolls contains complete, up-to-date information concerning every phase of roll manufacture, characteristic, application, operation, and maintenance. Thirty-four photographs, drawings and graphs, in addition to four tables of data, are included. One of these tables contains a summary of rubber roll troubles and suggestions for treatment.

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CONTINUOUS WINDING EQUIPMENT. By Robert J. Jacobs. Reprinted by Black-Clawson Co., Dilts Machine Works Div., Fulton, N.Y. 8½ x 11. 20 pages. Reprinted from *Paper, Film and Foil Converter* magazine, this article contains an outline of the basic procedure to guide in the selection of equipment. It explains, in brief terms, how each type of winder should be applied. The text includes competitive equipment references. Numerous sketches and illustrations are included.

1955 PULPWOOD ANNUAL. Edited by American Pulpwood Association. Published by *Pulp & Paper*, 370 Lexington Avenue, New York 17, N.Y. 8¼ x 11¼. 64 pages. $1.00. This annual contains complete sections on (1) woods training, safety and supervision; (2) pulpwood preparation, handling and hauling; (3) industrial forestry and wood utilization, and (4) a projection of the next 50 years and meeting its demand. Discussions on legal status of pulpwood producers; pulpwood logging trends, and the insurance factor in production of pulpwood are also included.

TODAY'S PAPERMAKERS' FELTS. Lockport Felt Co., Dept. PI, Newfane, N. Y. 5 x 7. 22 pages. This booklet covers the different stages of felt making, its uses, and discusses the care of the papermakers' felts. Included in this booklet are sections on wool, the fundamental material; synthetics; the manufacture of felts; treatments; mothproofing treatment; felt care; felt length measurements; common causes for felt failures, and past-present-future.

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New Literature . . .

TESTS OF A PORTABLE WOOD CHIPPER IN UTILIZING LOGGING RESIDUE AND IN DISPOSING OF BRUSH (Station Paper No. 30). By J. L. Arend, R. N. Smith, and R. A. Ralston. Published by Lake States Forest Experiment Station, St. Paul 1, Minn. 8 x 10½. 37 pages. A description of the portable wood chipper used in the study, the types of wood material chipped, average wood chip production rates and costs obtained, characteristics of the chips produced, and general performance of the machine tested are presented and discussed in this report.

75 QUESTIONS AND ANSWERS THAT WILL HELP YOU SELECT MATERIALS FOR VALVES TO COMBAT CORROSION. Reprinted by Cooper Alloy Corp., Hillside 5, N. J. 8½ x 11. 8 pages. This article reprint from *Chemical Engineering* magazine consists of 75 questions and answers designed to help in the selection and maintenance of stainless steel valves. Selection of materials, data on new materials, service and installation problems, as well as information on valve repair, are covered.

GUIDE TO THE SELECTION OF ENGINEERING IRONS (BULLETIN A-69). Published by International Nickel Co., Inc., 67 Wall St., New York 5, N. Y. 8½ x 11. 28 pages. This basic reference bulletin, compiled primarily for design engineers, presents the many valuable characteristics of modern nickel cast irons and illustrates their broad acceptance throughout industry. Fifty illustrations indicate wide industrial usage in all sizes and shapes. Twenty-seven tables, charts and photomicrographs show how through the use of nickel, alone or in combination with other alloying elements, the engineering properties of cast iron can be controlled to meet service requirements.

Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.

Soda Ash. Wyandotte Chemicals Corp., Wyandotte, Mich. — A cloth-bound book of 96 pages filled with product and application information, technical data, sampling methods, and tips on handling and storage.

Pulp Bleaching. Becco Chem. Div., Food Machinery & Chemical Corp., Dept. PI, Buffalo 7, N.Y. — Laboratory procedures for pulp bleaching are described in bulletin No. 66, together with two tables for reference.

Woven Wire Belting. Knapp Mills, Inc., Guidler Div., Dept. PI, Long Island City, N.Y. — This pamphlet, written by the inventor, describes a new control mechanism which limits side travel of woven wire belts, as used in heat-treating industries.

Latex Coatings. Sierra Talc & Clay Co., P.O. Box 390, 1608 Huntington Dr., Dept. PI, South Pasadena, Calif. — A 20-page, technical report on the pigmentation of Butadiene, Styrene (latex) emulsion with Mistron HGO-55, rutile and Trinity Superfine and rutile mixtures.

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Dealkalizing Salt Splitter. Cochrane Corp., Dept. PI, 17th St. & Allegheny Ave., Philadelphia 32, Pa.—Publication No. 4567 discusses the process of chloride anion exchange and why it is necessary to dealkalize water for boiler feed and for processing. It shows how water can be dealkalized with a new salt splitter. In addition to details of operation, advantages of the new dealkalizing salt splitter are listed.

Controlled Conditioning. J. O. Ross Engineering Corp., Dept. PI, 444 Madison Ave., New York 22, N. Y.—Bulletin No. 32, containing 4 pages, discusses the need for controlled conditioning of paper and lists ten advantages resulting from it. A discussion of the Ross Cycle Conditioner is presented. Photographs are included.

Vibrating Screens. Link-Belt Co., Dept. PR, 307 N. Michigan Ave., Chicago 1, Ill.—A complete line of vibrating screens for medium and heavy-duty screening operations is described in a new 12-page booklet, No. 2554. Engineering information, including capacity charts, to aid in selecting a vibrating screen for use with a given material at a specific capacity is contained in this booklet.

Aluminum. Aluminum Co. of America, Dept. PI, 736 Alcoa Bldg., Pittsburgh 19, Pa.—The growing applications of aluminum in the process industries are described in a new 8-page booklet titled "Aluminum in the Process Industries." The economic and technical advantages of aluminum used in processing equipment for chemical and material storage and for transporting liquids are outlined.

Overhead Cranes. Whiting Corp., Dept. PI, Harvey, Ill.—A complete presentation of the wide variety of handling jobs being performed by overhead cranes is offered in a 12-page booklet (Unit 80). Installation photographs show these cranes in action in various industries, including the paper industry. The booklet also spotlights the contribution made to better handling by each of the 14 major features of Whiting cranes.

Logging Rigging. Electric Steel Foundry Co., 2141 N. W. 25th Ave., Dept. PI, Portland 10, Ore. — With a quick selector indexing, this 26-page revised catalogue No. 185-B enables quick reference to the complete Esco line of work-hardening manganese and alloy steel logging riggings.

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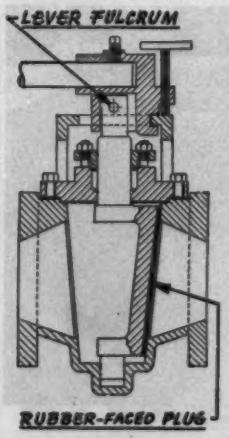

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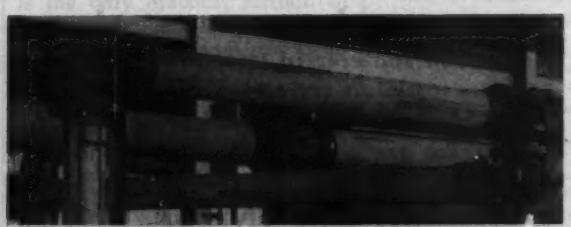

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No. 1 Light Prints	5.75 to 6.00
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Blue Overalls	8.00 to 8.50
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Suw Tan	6.50 to 6.75
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Linen Cuttings—	
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White	12.00 to 13.00
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Repacked	2.50 to 2.75
Thirds and Blues—	
Repacked	2.15 to 2.40
Miscellaneous	1.85 to 2.00
Whites, No. 1—	
Repacked	4.00 to 4.25
Miscellaneous	3.25 to 3.50
White, No. 2—	
Repacked	3.00 to 3.25
Miscellaneous	2.50 to 2.75

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	per cwt.
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New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)
ex dock New York City
OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
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French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shoppories	

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Gunny No. 1—	
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Domestic	5.50 to 6.00
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Heavy	5.75 to 6.25
No. 1 Scrap Bagging	4.50 to 5.00
Manila Rope—	
No. 1 large	6.00 to 6.25
No. 1 small	5.00 to 5.25
Sisal Rope—	
No. 1 large	4.75 to 5.00
No. 1 small	4.25 to 4.50
New Burlap Cuttings	5.75 to 6.25
Jute Threads—	
Foreign (Nom.)	6.00 to 6.25
Domestic	6.25 to 6.50
Strings—	
No. 1 sisal	4.75 to 5.00
No. 2 sisal	4.25 to 4.50
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Coated Soft	40.00 to 45.00
Fly Leaf No. 1	35.00 to 40.00
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Tripled Sorted No. 1 100%	40.00 to 45.00
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Ground, cwt.	4.30—
Powdered, cwt.	5.10—
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Dry, barrels	105.00—
Bleaching Powder—	
Drums, cwt	5.00 to 6.00
Casein (Domestic Standard) 20-30 mesh (bags), lb. 80-100 mesh (bags), lb.	27.00 to 29.00
Argentine, lb.	24.00 to 24.50
China Clay—	
Domestic Filler Bulk (mine) ton	10.00 to 13.00
Domestic Coating Bulk (mine) ton	17.00 to 25.00
Imported (ship side) Bulk (lump) ton	20.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.95—
Gelatine (silicon), lb.	1.25 to 1.35
Glyc. (C.P.) drums, lb.	.29½ to .30
Litharge, Powd. bbl. lb	.17 to .17½

MARKET QUOTATIONS

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E ..... 9.55—
F ..... 9.55—
G ..... 9.55—
WW ..... 9.70—

Rosin (Wood), carlots, F.O.B. South .... 6.00—

Salt Cake—
Dom. bulk (wks) ton 28.00 to 29.00
Imp. bulks on dock— (All. ports) ton (Nom.) ..... 22.00—

Soda Ash—
Bulk (works) cwt... 1.35—
Paper bags, cwt..... 1.65—

Soda (Caustic)—
Solid drums, cwt.... 3.85 to 4.50
Ground and flake, drums, cwt..... 4.25 to 5.00

Sodium Silicate—
60 deg. 55 gal. drums, (works) cwt..... 1.60 to 1.70
40 deg. 35 gal. drums, (works), cwt..... 1.35 to 1.40

Starch—
Pearl, 140 lb. bags, cwt. ..... 7.14—
Pearl, barrels, cwt. .. 7.14—
Paper (Sq.) bags, cwt. 7.14—
Powdered, barrels, cwt. 7.35—

Sulphur (Crude)
(Mine) bulk, long ton 26.50 to 28.00

Talc—
Dom. 100 lb. bags (mine) ton ..... 25.00 to 28.00
Canadian ..... 35.00 to 45.00

Titanium Dioxide—
Barium Pig. bbls., lb. .22½ to .23
Calcium Pig. bbls., lb. ..... .22½ to .23

Zinc Oxide, bags ..... 14.00 to 15.50

WOOD PULP

Quotations on domestic and Canadian wood pulp, dollars per short air dry ton, delivered consuming mills including basic freight allowances, follows:

Bleached Sulphite ....145.00—
Bleached Sulphite, Canadian .....150.00—
Unbleached Sulphite ...120.00—
Unbleached Sulphite, Canadian .....130.00—
Bleached Soda .....142.00 to 142.50
Bleached Soda, Canadian.142.00 to 142.50
Kraft Bleached .....147.00 to 150.00
Kraft, Bleach., Hardwood .....145.00—
Kraft, Bleach., Southern.150.00—
Kraft, Bleach., Canadian.150.00—
Kraft, Unbleached, Northern .....120.00—
Kraft, Unbleached, Southern .....112.50 to 120.00
Kraft, Unbleached, Canadian .....125.00—
Kraft, Semi-Bleached, Southern .....130.00 to 135.00
Sulphite Screenings .... 72.50—
Sulphate Screenings .... 67.50—
Groundwood ..... 80.00 to 85.00

Quotations on imported wood pulp, dollars per short ton, on dock American Atlantic ports with varying freight allowances, follow:

Bleached Sulphite, Swedish .....150.00—
Bleached Sulphite, Norwegian, freight allowed.145.00—
Bleached Sulphite, Finnish, freight allowed.150.00—
Unbleached Sulphite, Swedish .....130.00—
Unbleached Sulphite, Finnish, freight allowed .130.00—
Kraft, Unbleached, Swedish, freight allowed..115.00—
Kraft, Unbleached, Finnish, freight allow...115.00 to 145.00
Kraft, Bleached, Swedish, on dock....150.00—
Kraft, Bleached, Norwegian .....150.00—

PAPER

Quotations are mill quotations New York City

Boards—

Prices per ton, delivered in New York, 10 tons or more:

Plain chip ..... 90.00—
News vat lined chip .. 95.00—
.009 chip, rolls ..... 95.00—
Filled news ..... 90.00—
Solid news ..... 95.00—
White vat lined chip..125.00—
Chip tube and can stock.100.00—
Single manila lined chip.140.00—
Single jute lined chip..125.00—
Kraft liner .....130.00 to 140.00

White patent coated:
.020 .....155.00—
.018 .....157.50—
.016 .....160.00—

Book Paper f.o.b. New York— per cwt

Machine coated, two sides
70 lb. No. 2 enamel; 25x 4 cases $17.25
38-500, trimmed 4 sides. Carloads $16.30
45 lb. enamel, 25x38-500, 4 cases $13.05
trimmed 4 sides..... Carloads $12.10

Uncoated
55 lb. No. 2 offset, 25x38 4 cases $14.80
500, trimmed 4 sides.... Carloads $13.85
50 lb. A Grade English Finish, 25x38-500, un 4 cases $14.05
trimmed ..... Carloads $13.10
20 lb. envelope, 17x22-500, untrimmed ..... Carloads $12.40
16 lb. tablet, 17x22-500 ..... Carloads $11.35

Rag Content Bond—
(White, 5,000 to 10,000 lbs., basis 16 lb.)
100% rag..... 58.80—
75% rag..... 45.45—
50% rag..... 36.20—
25% rag..... 29.70—

Rag Content Ledger—
(White, 5,000 to 10,000 lbs.)
100% rag..... 58.80—
75% rag..... 45.45—
50% rag..... 36.20—
25% rag..... 29.70—

Sulphite Bond—
(White, 5,000 to 10,000 lbs., basis 16 lb.)
No. 1..... 20.10—
No. 2..... 20.40—
No. 4..... 17.75—

Sulphite Ledger—
(White, 5,000 to 10,000 lbs.)
No. 1..... 20.50—
No. 2..... 19.75—
No. 4..... 18.15—

News delivered in New York— per ton
Rolls, Standard (Contract) .....125.00 to 126.00
Rolls (Spot) ..... (Nominal)
Sheets .....138.00—

Tissues (Carlots) f.o.b. New York— per ream
White No. 1..... 1.75—
White No. 2 ..... 1.35—
Bleached Anti-Tarnish.. 2.20—
Colored ..... 2.00—
Anti-Tarnish Kraft .. 1.65—
Manila ..... 2.00—
Napkins, semi-crepe (12½ lb. to M shts.) per cs. ..... 1.00—
Napkins, full crepe and embossed (12½ lb. to Mshts.) per cs. .. 1.00—
Toilet, Bleached (M shts.) per cs..... 9.35—
Toilet, Unbleached (M shts.) per cs. .. 7.90—

Towels f.o.b. New York— per case
Bleached ..... 6.80—
Unbleached ..... 5.90—

Wrappings (Kraft) f.o.b. New York— (Basis 50 lb. & heavier) per cwt.
Standard wrapping .... 8.25—
Butchers, counter rolls.. 8.50—
Standard bag, mill rolls. 7.75—
Shipping sack, mill rolls. 8.00—
Gumming, mill rolls.... 8.25—
Asphalting, mill rolls...8.00—
Envelope, mill rolls.... 9.50—

Suction Press Rolls Now Cleaned Thoroughly WITHOUT DRILLING

It used to take 8 men 48 hours to drill through the clogged holes of a suction press roll in a Canadian mill. Not any more! Now the rolls are opened up, thoroughly and safely, in less than 6 hours—and without drilling.

It's all done by chemical circulation. Recommended Oakite solutions are passed through the holes, filtered, and returned to the tank for recirculation. That's all there is to it. You save time, money. Your equipment lasts longer.

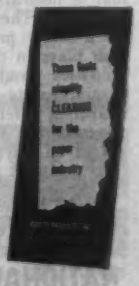
Other mills using specialized Oakite materials and methods report as follows:

"Took 2 men 4 days to drill out suction press rolls. Now clean in 4 hours with Oakite solution."

"Well pleased with Oakite cleaning since we will get an added week or two of service from this felt."

"Felts returned to original color after being brown with pitch, and vacuum readings on the suction press rolls dropped as a result of felts being so clean."

FREE BOOKLET gives complete details, including schematic drawing of setup. Also tells how to restore felt absorbency; soak-clean Fourdrinier wires; remove slime and pitch; steam-clean save-alls, etc. Write for your copy—today. Oakite Products Inc., 74 Rector St., New York 6, New York.



SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. and Canada

PUT ACTION IN YOUR SAFETY PROGRAM

Add a touch of showmanship to your safety program. Films let you tell your training story with the dramatic impact of pictures . . . action . . . sound. You can cut your safety training in half, give fewer refresher courses and get better results by using training films.

Here are three film sets that will help you arouse and keep alive interest in your safety program. And there is no better way to teach foremen how to be better supervisors.

SPEAKING OF SAFETY

A brand new set of films that will teach your foremen and supervisors the tips they should know about making safety talks, and how to transmit management's ideas and plans. Six 35mm sound slidefilms and leader's manual in an attractive leatherette case.

HUMAN FACTORS IN SAFETY

This is a series of six 35mm sound slidefilms with leader's manual that may be used for an advanced safety course. Each film deals with one aspect of the complex art of handling people. Collectively, the films show how to train workers, how to keep experienced people on their toes and how to win respect, cooperation and loyal support.

SAFETY MANAGEMENT FOR FOREMEN

A set of ten 35mm sound slidefilms—all that is needed for a course in safety fundamentals. The films explain how to organize a safety program, what part the foreman plays in the program and how safety increases production. They also discuss specific safety activities, such as machine guarding, safety inspections, the first aid program, etc. Complete with leader's manual in an attractive leatherette case.

Write for complete information and details to the

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Portrait by Fabian Bachrach

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Vinyl resins are setting new standards of performance in many industries. In answer to fast growing acceptance, National has just completed its second vinyl resin plant at Meredosia, Illinois. The new plant will supplement the production of National's Plainfield, N. J., plant and offer faster service with added convenience to customers in the Midwest.

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An internally plasticized, permanently flexible polyvinyl acetate copolymer latex—National's Resyn 12K-03—offers high solids pigment sizes at water thin viscosity.

Resyn 12K-03 improves calenderability, gloss and water-resistance at low binder ratios. Its inherent grease-resistance promotes gloss ink holdout.

Supplied at approximately 42% solids in submicroscopic dispersion, Resyn 12K-03 has excellent stability to high shear agitation.

NU-FILM T USEFUL IN GREASEPROOFING GLASSINE

One of National's specialty starches, Nu-Film T can be used to impart greaseproofness to glassine at the size press. Low concentrations are effective.

Nu-Film T is the sodium salt of a chemically modified starch containing carboxylic and sulfonic acid groups. The presence of hydrophillic groups in the molecular structure greatly enhances the greaseproofness of a variety of glassine grades.

SIZE PRESS VERSATILITY WITH FIBERSIZE 85

Tailored Properties Permit Range of Application from Sizing to Coating

Fibersize 85, the latest addition to National's family of oxidized starches, pinpoints starch uniformity for size press applications. Physical and chemical properties are tailored to narrow limits during conversion to meet the requirements of the size press. The result? Stability, clarity, film forming and pigment suspending and binding powers are always the same. Viscosity can be duplicated repeatedly. A wide range of formulations *from starch sizing to offset coatings* can be applied with unusual ease and improved properties.

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Or, depending on the requirements of the job at hand, one of National's other specialties may prove best for your needs:

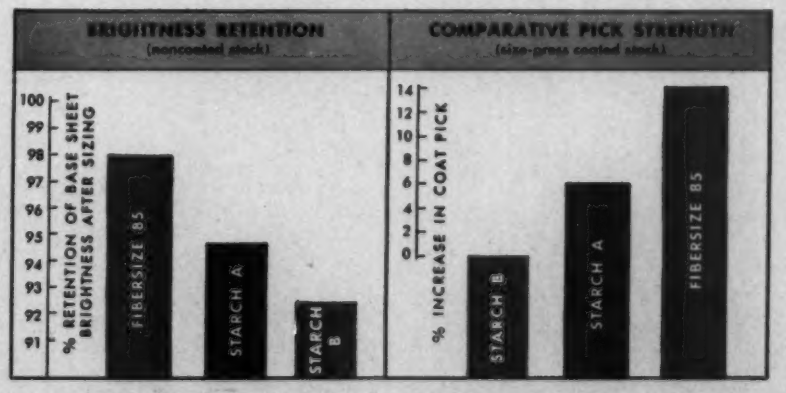
FIBERSIZE—a lower viscosity version of Fibersize 85.

NALEX 50—a moderately converted starch for pigmenting or sizing at very low solids.

NADEX 350—a dextrin of excellent quality for high solids sizing.

#16 STARCH—a premium quality buffered pearl with closely controlled pH for enzyme conversion.

If you'd like to evaluate any or all of these size press starches, contact your nearest National office. Our Starch technologists will be happy to work with you.



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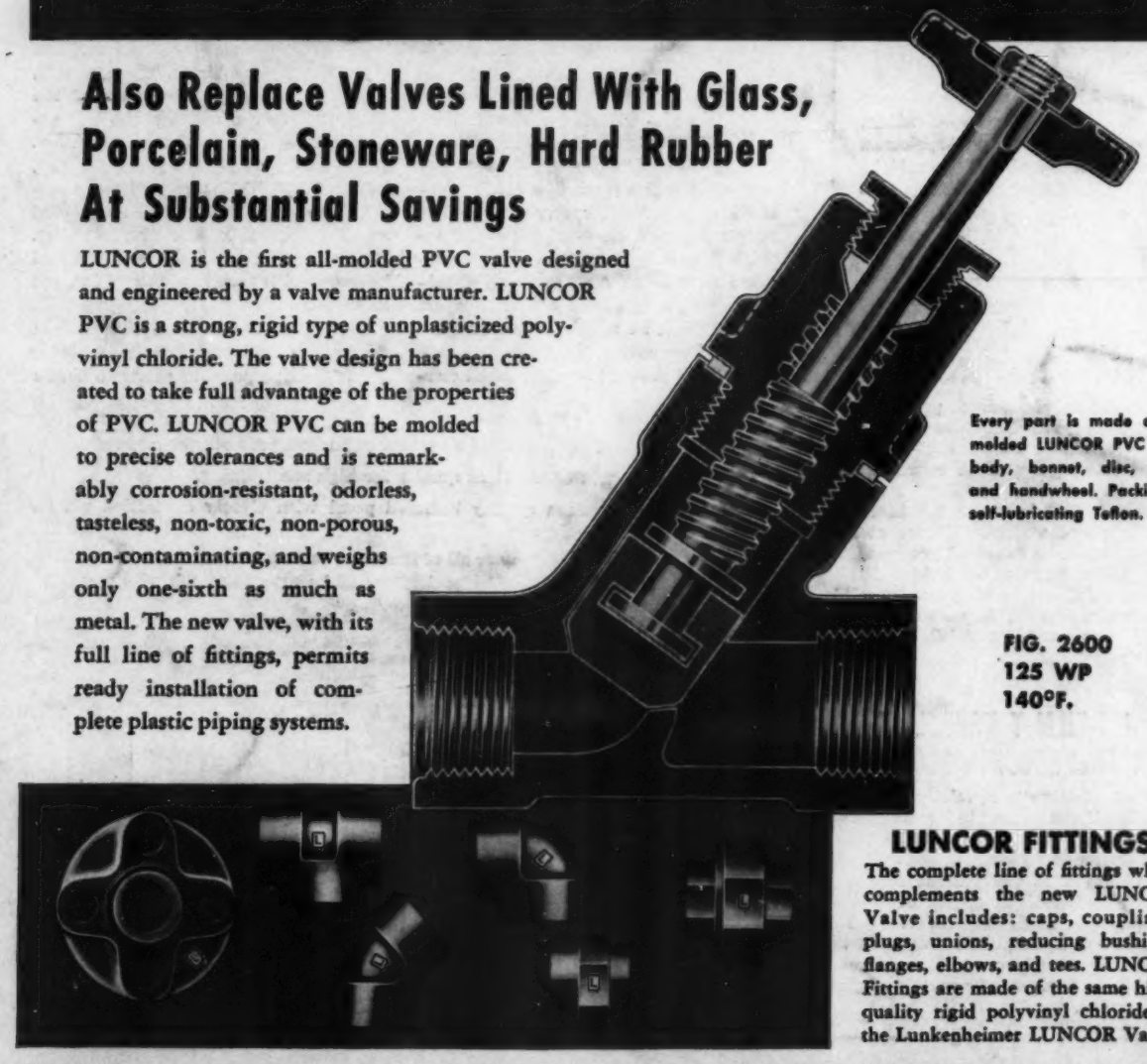

Every part is made of all molded LUNCOR PVC . . . body, bonnet, disc, stem, and handwheel. Packing is self-lubricating Teflon.

FIG. 2600
125 WP
140°F.

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The complete line of fittings which complements the new LUNCOR Valve includes: caps, couplings, plugs, unions, reducing bushings, flanges, elbows, and tees. LUNCOR Fittings are made of the same high-quality rigid polyvinyl chloride as the Lunkenheimer LUNCOR Valve.

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